

# UC DAVIS

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**General Catalog  
1998-99**



## From the Chancellor



Welcome to UC Davis. We're delighted you've chosen the Davis campus as the place to pursue your academic goals. All of us—faculty, staff and administrators—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. You will 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. For that to happen there must be a partnership among many individuals working together to ensure the most intellectually stimulating, technologically sophisticated and culturally rich environment. That partnership includes you, the student. Your energy and vision are the catalysts that energize and inspire each of us to help make your time at UC Davis challenging, meaningful—and, yes—fun.

We are very proud of UC Davis. Long renowned for its agricultural and veterinary science programs, in recent years we have attained international stature for our programs in engineering, biological sciences, the humanities and the social sciences. 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. UC Davis is a member of the prestigious Association of American Universities, a select group of 62 institutions of higher learning whose membership is by invitation only. Our alumni have made significant and lasting contributions to society as leaders in government, business, technology, media and the arts. And our students—the cream of California's crop—consistently persist and graduate at the highest rates among the University of California campuses.

UC Davis' character has been built through decades of commitment to a unique core of values and principles. We are using our talents and ingenuity to continue working toward a community that honors our diversity as individuals and reflects our belief in a shared set of values. I'm happy you're about to join our community. Congratulations on becoming an Aggie!

Larry N. Vanderhoef  
Chancellor

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### Davis Campus Map/inside back cover

**ADDRESS DIRECTORY**

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

**Information Services Office**

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

**Memorial Union Campus Information Desk**

530-752-2222

**Office of the Chancellor**

Mrak Hall  
530-752-2065

**College of Agricultural and Environmental Sciences**

228 Mrak Hall  
530-752-0107

**College of Engineering**

1050 Engineering II  
530-752-0553

**College of Letters and Science**

200 Social Sciences and Humanities Building  
530-752-0392

**Division of Biological Sciences**

202 Life Sciences Addition  
530-752-0410

**Graduate Studies**

250 Mrak Hall  
530-752-0650

**Graduate School of Management**

106 AOB IV  
530-752-7362

**School of Law**

1011 King Hall  
530-752-0243

**School of Medicine**

Medical Sciences 1C  
530-752-0331

**School of Veterinary Medicine**

112 Surge IV  
530-752-1360

**Office of Summer Sessions**

44 Mrak Hall  
530-752-1647

**University Extension**

1333 Research Park Drive  
530-757-8777

**News Service**

334 Mrak Hall  
530-752-1930

**Legal Analyst—Residence Matters**

111 Franklin St., 8th Floor  
Oakland, CA 94607-5206

**Admissions**

|                         |                                                                                 |
|-------------------------|---------------------------------------------------------------------------------|
| Undergraduate:          | Undergraduate Admissions and Outreach Services<br>175 Mrak Hall<br>530-752-2971 |
|                         | EOP Office of Admissions<br>175 Mrak Hall<br>530-752-2993                       |
| Graduate:               | Graduate Studies Admissions<br>252 Mrak Hall<br>530-752-0655                    |
| Law:                    | School of Law Admissions<br>115 King Hall<br>530-752-6477                       |
| Management:             | Graduate School of Management<br>106 AOB 4<br>530-752-7399                      |
| Medicine:               | School of Medicine Admissions<br>Medical Sciences 1C<br>530-752-2717            |
| Veterinary<br>Medicine: | School of Veterinary Medicine<br>Admissions<br>125 Surge IV<br>530-752-1383     |

**Office of the Registrar**

12 Mrak Hall  
530-752-2973  
(for registration information, transcripts, the *General Catalog*)

**Financial Aid Office**

227 Voorhies Hall  
530-752-2390  
(undergraduate and graduate loans, grants,  
employment information)

**Undergraduate Scholarship Office**

228 Voorhies Hall  
530-752-2804

**Fellowships and Graduate Scholarships**

Graduate Studies  
252 Mrak Hall  
530-752-7481

**Teaching and Research Assistantships**

Write to department or group concerned.

**ASUCD (Associated Students UCD)**

Basement, South Hall  
530-752-1990

**Disability Resource Center**

160 South Silo  
530-752-3184 (voice), 530-752-6833 (telephone device  
for the speech and hearing impaired)

**Student Health Service**

54A Cowell Student Health Center  
530-752-2300

**Housing**

|                           |                                          |
|---------------------------|------------------------------------------|
| Residence Halls:          | Student Housing Office<br>530-752-2033   |
| Student Family<br>Housing | Orchard Park/Solano Park<br>530-752-4000 |

|                                                                                                                                                                                                                           | <b>FALL 1998</b>                           | <b>WINTER 1999</b>            | <b>SPRING 1999</b>     | <b>FALL 1999<br/>(tentative)</b>        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|------------------------|-----------------------------------------|
| Deadline for filing Independent Study Program project proposal form                                                                                                                                                       | April 16                                   | Oct. 14, 1998                 | January 20             | April 15                                |
| <i>Class Schedule and Room Directory</i> available                                                                                                                                                                        | May 18                                     | Oct. 27, 1998                 | February 1             | May 17                                  |
| Students may call <b>RSVP**</b> to hear appointment times                                                                                                                                                                 | May 18                                     | October 27                    | February 1             | May 17                                  |
| Faculty advisers available                                                                                                                                                                                                | May 21-22                                  | October 29-30                 | February 4-5           | May 20-21                               |
| <b>RSVP</b> Pass 1 (assigned appointments)                                                                                                                                                                                | May 26–Aug. 27                             | November 2-13                 | February 8-19          | June 1–Aug. 26                          |
| <b>RSVP</b> Pass 2 (assigned appointments)                                                                                                                                                                                | Aug. 31–Sept. 11                           | Nov. 30–Dec 11                | March 1-12             | Aug. 30–Sept. 10                        |
| Last day to register (pay fees <b>and</b> enroll in classes) without incurring a \$50 late fee                                                                                                                            | September 11                               | December 11                   | March 12               | September 10                            |
| Last day to petition for classification to resident status                                                                                                                                                                | September 11                               | December 11                   | March 12               | September 10                            |
| <b>Quarter begins</b>                                                                                                                                                                                                     | <b>Sept. 28, Mon.</b>                      | <b>Jan. 4, Mon.</b>           | <b>March 31, Wed.</b>  | <b>Sept. 27, Mon.</b>                   |
| Orientation                                                                                                                                                                                                               | Sept. 28–30                                | Jan. 4–5                      | Mar. 31–April 1        | Sept. 27–29                             |
| <b>Instruction begins</b>                                                                                                                                                                                                 | <b>Oct. 1, Thurs.</b>                      | <b>Jan. 6, Wed.</b>           | <b>April 2, Fri.</b>   | <b>Sept. 30, Thurs.</b>                 |
| Last day to file petitions for PELP—current quarter                                                                                                                                                                       | October 1                                  | January 6                     | April 2                | September 30                            |
| Last day <ul style="list-style-type: none"> <li>• of late fee payment</li> <li>• to drop courses via <b>RSVP</b></li> <li>• to change from part-time to full-time status or from full-time to part-time status</li> </ul> | Oct. 14, Wed.                              | Jan. 20, Wed.                 | April 15, Thurs.       | Oct. 13, Wed.                           |
| Last day <ul style="list-style-type: none"> <li>• to add courses via <b>RSVP</b></li> </ul>                                                                                                                               | Oct. 21, Wed.                              | Jan. 27, Wed.                 | April 22, Thurs.       | Oct. 20, Wed.                           |
| Last day <ul style="list-style-type: none"> <li>• to opt to take courses on a P/NP basis</li> <li>• to file to take courses on a S/U basis</li> </ul>                                                                     | Nov. 4, Wed.                               | Feb. 10, Wed.                 | May 6, Thurs.          | Nov. 3, Wed.                            |
| Monday classes meet                                                                                                                                                                                                       |                                            | Mar. 17, Wed.                 |                        |                                         |
| <b>Instruction ends</b>                                                                                                                                                                                                   | <b>Dec. 11, Fri.</b>                       | <b>Mar. 17, Wed.</b>          | <b>June 10, Thurs.</b> | <b>Dec. 10, Fri.</b>                    |
| Final examinations                                                                                                                                                                                                        | Dec. 14–19                                 | Mar. 19–25                    | June 12–18             | Dec. 13–18                              |
| <b>Quarter ends</b>                                                                                                                                                                                                       | <b>Dec. 19, Sat.</b>                       | <b>Mar. 25, Thurs.</b>        | <b>June 18, Fri.</b>   | <b>Dec. 18, Sat.</b>                    |
| Commencement 1999                                                                                                                                                                                                         |                                            |                               | Mid-June§              |                                         |
| Academic and Administrative Holidays                                                                                                                                                                                      | Nov. 26–27<br>Dec. 24–25<br>Dec. 31–Jan. 1 | Jan. 18<br>Feb. 15<br>Mar. 29 | May 31                 | Nov. 25–26<br>Dec. 24, 27<br>Dec. 30–31 |
| <b>Filing for Graduation</b>                                                                                                                                                                                              |                                            |                               |                        |                                         |
| Filing period for those who expect to complete work for a bachelor's degree to file for candidacy with the Office of the Registrar †                                                                                      | June 1–Oct. 14                             | Nov. 9–Jan. 20, 1999          | Feb. 8–April 15        | June 4–Oct. 13                          |
| <b>Filing for Minor Program</b>                                                                                                                                                                                           |                                            |                               |                        |                                         |
| Deadline for students who plan to complete a minor program to file with the Dean's Office ‡                                                                                                                               | October 14                                 | January 20                    | April 15               | October 13                              |
| <b>Admission/Readmission Deadlines</b>                                                                                                                                                                                    |                                            |                               |                        |                                         |
| Deadline for undergraduates to file admission applications for 1998-99 and fall 1999                                                                                                                                      | Nov. 30, 1997                              | July 31, 1998                 | Oct. 31, 1998          | Nov. 30, 1998                           |
| Deadline for filing readmission applications with the Registrar for undergraduate status                                                                                                                                  | July 31, 1998                              | Oct. 30, 1998                 | Jan. 29, 1999          | July 30, 1999                           |

**Summer Sessions I and II, 1999**

**June 28–August 6, 1999, and August 9–September 17, 1999**

**Financial Aid Deadlines**

Filing period for grants, loans, work-study and California Student Aid awards for **1999-2000: January 1-March 2, 1999**

\* Dates are subject to change and should be checked with appropriate *Class Schedule and Room Directory*.

\*\* **RSVP** (Register Students Via Phone) is the UC Davis telephone registration system.

† For students graduating September 1999, the filing period is May 25–July 2.

‡ For students graduating September 1999, the deadline to file a minor program with Dean's Office is July 2.

§ Law—May 22; Medicine—June 11; Graduate Studies—June 17; Veterinary Medicine—June 18; Engineering—June 18; Management—June 19; Agricultural and Environmental Sciences—June 19; Biological Sciences—June 19; Letters and Science—June 20.

## DEGREES OFFERED BY UC DAVIS

Undergraduate majors are administered by the colleges of Agricultural and Environmental Sciences (A&ES), Letters and Science (L&S) and Engineering. Professional studies are administered by the schools indicated. All graduate programs are administered by 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, M.A.—Master of Arts, M.A.M.—Master of Agricultural Management, 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.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.

### Administration

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

### Aeronautical Science and Engineering

B.S. ....Engineering

### African American and African Studies

A.B. ....L&S

### Agricultural and Environmental Chemistry

M.S., Ph.D.

### Agricultural and Managerial Economics

B.S. ....A&ES

### Agricultural and Resource Economics

M.S., Ph.D.

### Agricultural Education

Credential

### Agricultural Systems and Environment

B.S. ....A&ES

### Agromony

M.S.

### American Studies

A.B. ....L&S

### Animal Behavior

Ph.D.

### Animal Biology

B.S. ....A&ES

### Animal Science

B.S., M.A.M., M.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

M.S., Ph.D.

### Applied Physics

B.S. ....L&S

### Art

M.F.A.

### Art History

A.B. ....L&S

### Art Studio

A.B. ....L&S

### Atmospheric Science

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

### Avian Sciences

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

### Biochemistry

B.S. ....A&ES or L&S

### Biochemistry and Molecular Biology

M.S., Ph.D.

### Biological Sciences

A.B. or B.S. ....A&ES or L&S

### Biological Systems Engineering

B.S. ....Engineering

### Biomedical Engineering

M.S., Ph.D.

### Biophysics

Ph.D.

### Biotechnology

B.S. ....A&ES

### Cell and Developmental Biology

Ph.D.

### Cell Biology

B.S. ....A&ES or L&S

### Chemical Engineering

B.S. ....Engineering

### Chemical/Biochemical Engineering

B.S. ....Engineering

### Chemical Engineering/Materials Science and Engineering

B.S. ....Engineering

### Chemistry

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

### Chicana/Chicano (Mexican-American) Studies

A.B. ....L&S

### Child Development

M.S.

### Chinese

A.B. ....L&S

### Civil Engineering

B.S. ....Engineering

### Civil Engineering/Materials Science and Engineering

B.S. ....Engineering

### Classical Civilization

A.B. ....L&S

### Classics

M.A.\*

### Communication

A.B. ....L&S

### Community and Regional Development

B.S. ....A&ES

### Community Development

M.S.

### Community Nutrition

B.S. ....A&ES

### Comparative Literature

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

### Comparative Pathology

M.S., Ph.D.

### Computer Engineering

B.S. ....Engineering

### Computer Science

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

### Computer Science and Engineering

B.S. ....Engineering

### Crop Science and Management

B.S. ....A&ES

### Design

B.S. ....A&ES

### Dietetics

B.S. ....A&ES

### Dramatic Art

A.B., M.A.\*, M.F.A., Ph.D. ....L&S

### East Asian Studies

A.B. ....L&S

### Ecology

M.S., Ph.D.

### Economics

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

### Education

M.A., M.Ed.\*, Ph.D., Ed.D., credential

### Electrical Engineering

B.S. ....Engineering

### Electrical Engineering/Materials Science and Engineering

B.S. ....Engineering

### Endocrinology

M.S., Ph.D.

### Engineering

M.Engr., M.S., D.Engr., Ph.D.

### Engineering—Applied Science

M.S., Ph.D. ....Engineering

### English

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

### Entomology

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

### Environmental and Resource Sciences

B.S. ....A&ES

### Environmental Biology and Management

B.S. ....A&ES

|                                                                 |                                            |
|-----------------------------------------------------------------|--------------------------------------------|
| <b>Environmental Horticulture and Urban Forestry</b>            | B.S. ....A&ES                              |
| <b>Environmental Policy Analysis and Planning</b>               | B.S. ....A&ES                              |
| <b>Environmental Toxicology</b>                                 | B.S. ....A&ES                              |
| <b>Epidemiology</b>                                             | M.S., Ph.D.                                |
| <b>Evolution and Ecology</b>                                    | A.B. or B.S. ....A&ES or L&S               |
| <b>Exercise Science</b>                                         | A.B., B.S., M.S.* .....L&S                 |
| <b>Family Nurse Practitioner/Physician Assistant</b>            | Credential .....School of Medicine         |
| <b>Fermentation Science</b>                                     | B.S. ....A&ES                              |
| <b>Fiber and Polymer Science</b>                                | B.S. ....A&ES                              |
| <b>Food Biochemistry</b>                                        | B.S. ....A&ES                              |
| <b>Food Engineering</b>                                         | B.S. ....Engineering                       |
| <b>Food Science</b>                                             | B.S., M.S., Ph.D. ....A&ES                 |
| <b>French</b>                                                   | A.B., M.A.*, Ph.D. ....L&S                 |
| <b>Genetics</b>                                                 | B.S., M.S., Ph.D. ....A&ES or L&S          |
| <b>Geography</b>                                                | M.A., Ph.D.                                |
| <b>Geology</b>                                                  | A.B. or B.S., M.S., Ph.D. ....L&S          |
| <b>German</b>                                                   | A.B., M.A.*, Ph.D.* .....L&S               |
| <b>Greek</b>                                                    | A.B.* .....L&S                             |
| <b>History</b>                                                  | A.B., M.A.*, Ph.D. ....L&S                 |
| <b>History of Art</b>                                           | M.A.                                       |
| <b>Horticulture</b>                                             | M.S.                                       |
| <b>Human Development</b>                                        | B.S., Ph.D. ....A&ES                       |
| <b>Hydrologic Science</b>                                       | M.S., Ph.D.                                |
| <b>Hydrology</b>                                                | B.S. ....A&ES                              |
| <b>Immunology</b>                                               | M.S., Ph.D.                                |
| <b>Individual Major</b>                                         | A.B., B.S. ....A&ES or L&S                 |
| <b>International Agricultural Development</b>                   | B.S., M.S. ....A&ES                        |
| <b>International Relations</b>                                  | A.B. ....L&S                               |
| <b>Italian</b>                                                  | A.B. ....L&S                               |
| <b>Japanese</b>                                                 | A.B. ....L&S                               |
| <b>Landscape Architecture</b>                                   | B.S. ....A&ES                              |
| <b>Latin</b>                                                    | A.B.* .....L&S                             |
| <b>Law</b>                                                      | J.D., LL.M. ....School of Law              |
| <b>Linguistics</b>                                              | A.B., M.A. ....L&S                         |
| <b>Materials Science and Engineering</b>                        | B.S. ....Engineering                       |
| <b>Mathematics</b>                                              | A.B. or B.S., M.A., M.A.T., Ph.D. ....L&S  |
| <b>Mechanical Engineering</b>                                   | B.S. ....Engineering                       |
| <b>Mechanical Engineering/Materials Science and Engineering</b> | B.S. ....Engineering                       |
| <b>Medicine</b>                                                 | M.D. ....School of Medicine                |
| <b>Medieval Studies</b>                                         | A.B. ....L&S                               |
| <b>Microbiology</b>                                             | A.B. or B.S., M.S., Ph.D. ....A&ES or L&S  |
| <b>Music</b>                                                    | A.B., M.A., M.A.T.*, Ph.D. ....L&S         |
| <b>Native American Studies</b>                                  | A.B. ....L&S                               |
| <b>Nature and Culture</b>                                       | A.B. ....L&S                               |
| <b>Neurobiology, Physiology and Behavior</b>                    | B.S. ....A&ES or L&S                       |
| <b>Neuroscience</b>                                             | Ph.D.                                      |
| <b>Nutrition</b>                                                | M.S., Ph.D.                                |
| <b>Nutrition Science</b>                                        | B.S. ....A&ES                              |
| <b>Pharmacology and Toxicology</b>                              | M.S., Ph.D.                                |
| <b>Philosophy</b>                                               | A.B., M.A., Ph.D. ....L&S                  |
| <b>Physical Education</b>                                       | M.A.*                                      |
| <b>Physics</b>                                                  | A.B. or B.S., M.S., Ph.D. ....L&S          |
| <b>Physiology</b>                                               | M.S., Ph.D.                                |
| <b>Plant Biology</b>                                            | A.B. or B.S., M.S., Ph.D. ....A&ES or L&S  |
| <b>Plant Pathology</b>                                          | M.S., Ph.D.                                |
| <b>Plant Protection and Pest Management</b>                     | M.S.                                       |
| <b>Political Science</b>                                        | A.B., M.A., Ph.D. ....L&S                  |
| <b>Political Science—Public Service</b>                         | A.B. ....L&S                               |
| <b>Population Biology</b>                                       | M.S., Ph.D.                                |
| <b>Preventive Veterinary Medicine</b>                           | M.P.V.M. ....School of Veterinary Medicine |
| <b>Psychology</b>                                               | A.B. or B.S., Ph.D. ....L&S                |
| <b>Range and Wildlands Science</b>                              | B.S.* .....A&ES                            |
| <b>Religious Studies</b>                                        | A.B. ....L&S                               |
| <b>Rhetoric and Communication</b>                               | M.A.*                                      |
| <b>Russian</b>                                                  | A.B., M.A.* .....L&S                       |
| <b>Sociology</b>                                                | A.B., M.A., Ph.D. ....L&S                  |
| <b>Sociology—Organizational Studies</b>                         | A.B. ....L&S                               |
| <b>Soil Science</b>                                             | M.S., Ph.D.                                |
| <b>Soil and Water Science</b>                                   | B.S. ....A&ES                              |
| <b>Spanish</b>                                                  | A.B., M.A., Ph.D. ....L&S                  |
| <b>Statistics</b>                                               | A.B. or B.S., M.S., Ph.D. ....L&S          |
| <b>Textiles</b>                                                 | M.S.                                       |
| <b>Textiles and Clothing</b>                                    | B.S. ....A&ES                              |
| <b>Textile Arts and Costume Design</b>                          | M.F.A.                                     |
| <b>Transportation Technology and Policy</b>                     | M.S., Ph.D.                                |
| <b>Vegetable Crops</b>                                          | M.S.                                       |
| <b>Veterinary Medicine</b>                                      | D.V.M. ....School of Veterinary Medicine   |
| <b>Viticulture and Enology</b>                                  | B.S. ....A&ES                              |
| <b>Wildlife, Fish and Conservation Biology</b>                  | B.S. ....A&ES                              |
| <b>Women's Studies</b>                                          | A.B. ....L&S                               |

## MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by both the College of Agricultural and Environmental Sciences (A&ES) and the College of Letters and Science (L&S). The College of Engineering does not offer any minors. 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                                              | Geographic Information Systems<br>(Biological & Agricultural Engineering), A&ES                                                     |
| Aging and Adult Development<br>(Human & Community Development), A&ES                   | Geographic Studies (Environmental Design), A&ES                                                                                     |
| Agricultural and Managerial Economics<br>(Agricultural and Resource Economics), A&ES   | Geology, L&S                                                                                                                        |
| Agricultural Computing & Information Systems<br>(Agronomy), A&ES                       | Geophysics (Geology), L&S                                                                                                           |
| Agricultural Entomology (Entomology), A&ES                                             | German, L&S                                                                                                                         |
| Agricultural Systems and Environment<br>(Agronomy), A&ES                               | Greek (Classics), L&S                                                                                                               |
| American Studies, L&S                                                                  | History, L&S                                                                                                                        |
| Animal Science, A&ES                                                                   | History and Philosophy of Science, L&S                                                                                              |
| Anthropology, L&S                                                                      | Human Development<br>(Human & Community Development), A&ES                                                                          |
| Apiculture (Entomology), A&ES                                                          | Hydrology<br>(Land, Air and Water Resources), A&ES                                                                                  |
| Applied Biological Systems Technology<br>(Biological & Agricultural Engineering), A&ES | Insect Ecology (Entomology), A&ES                                                                                                   |
| Art History, L&S                                                                       | International Agricultural Development<br>(Human & Community Development), A&ES                                                     |
| Art Studio, L&S                                                                        | Italian, L&S                                                                                                                        |
| Asian American Studies, L&S                                                            | Japanese (Chinese and Japanese), L&S                                                                                                |
| Atmospheric Science<br>(Land, Air and Water Resources), A&ES                           | Jewish Studies (Humanities), L&S                                                                                                    |
| Avian Sciences (Avian Sciences), A&ES                                                  | Latin (Classics), L&S                                                                                                               |
| Biological Sciences, A&ES or L&S                                                       | Linguistics, L&S                                                                                                                    |
| Chicana/Chicano (Mexican-American) Studies, L&S                                        | Mathematics, L&S                                                                                                                    |
| Chinese, L&S                                                                           | Medical-Veterinary Entomology (Entomology), A&ES                                                                                    |
| Classical Civilization (Classics), L&S                                                 | Medieval Studies, L&S                                                                                                               |
| Communication, L&S                                                                     | Music, L&S                                                                                                                          |
| Community Development<br>(Human & Community Development), A&ES                         | Native American Studies, L&S                                                                                                        |
| Community Nutrition (Nutrition), A&ES                                                  | Nature and Culture, L&S                                                                                                             |
| Comparative Literature, L&S                                                            | Nematology, A&ES                                                                                                                    |
| Computer Science, L&S                                                                  | Nutrition and Food (Nutrition), A&ES                                                                                                |
| Dramatic Art, L&S                                                                      | Nutrition Science (Nutrition), A&ES                                                                                                 |
| East Asian Studies, L&S                                                                | Philosophy, L&S                                                                                                                     |
| Economics, L&S                                                                         | Physics, L&S                                                                                                                        |
| Economy, Justice and Society, L&S                                                      | Plant Biology, A&ES or L&S                                                                                                          |
| Education, L&S                                                                         | Political Science, L&S                                                                                                              |
| Energy Policy (Environmental Studies), A&ES                                            | Precision Agriculture (Biological and Agricultural<br>Engineering), A&ES                                                            |
| English, L&S                                                                           | Psychology, L&S                                                                                                                     |
| Entomology, A&ES                                                                       | Recreation (Environmental Studies), A&ES                                                                                            |
| Environmental Geology (Geology), L&S                                                   | Religious Studies, L&S                                                                                                              |
| Environmental Horticulture, A&ES                                                       | Russian, L&S                                                                                                                        |
| Environmental Policy Analysis<br>(Environmental Studies), A&ES                         | Science and Society, A&ES                                                                                                           |
| Environmental Toxicology, A&ES                                                         | Social and Ethnic Relations (African American Studies,<br>Asian American Studies, Native American Studies,<br>Women's Studies), L&S |
| Exercise Science, L&S                                                                  | Sociology, L&S                                                                                                                      |
| Fiber and Polymer Science (Textiles and Clothing),<br>A&ES                             | Soil Science (Land, Air and Water Resources), A&ES                                                                                  |
| Film Studies (Humanities), L&S                                                         | Spanish, L&S                                                                                                                        |
| Food Service Management (Nutrition), A&ES                                              | Statistics, L&S                                                                                                                     |
| French, L&S                                                                            | Textiles and Clothing, A&ES                                                                                                         |
|                                                                                        | War–Peace Studies (International Relations), L&S                                                                                    |
|                                                                                        | Women's Studies, L&S                                                                                                                |



# INTRODUCTION



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*Bicycles.  
Friendly faces.  
Open space  
and a feeling  
of belonging.  
A college town;  
a world-class  
university.*

---



## Small town. Big school.

**W**ELCOME TO THE University of California, Davis. Set between the Coast Range to the west and the towering Sierra Nevada to the east in the heart of California's Central Valley, UC Davis is close to the thriving and vibrant state capital and the San Francisco Bay Area but cherishes its small-town culture and security. Nearly everyone—students, faculty, administrators, staff—lives near campus, close enough to ride a bicycle to class or work, close enough to walk to town for dinner and a movie. Our students come from every California county, all 50 states and 111 foreign countries, creating a diverse cultural and intellectual community that enriches us all.

The campus's reputation has attracted a distinguished faculty of scholars and scientists in all fields. UC Davis faculty rank 16th in quality among comprehensive public universities nationwide, according to a multi-year study of U.S. doctoral programs reported in 1995 by the National Research Council. Creative teaching and academic innovation are encouraged by several programs, including the \$30,000 Prize for Teaching and Scholarly Achievement, believed to be the largest award of its kind in the country. And UC Davis undergraduate students persist and graduate at the highest rates among UC campuses.

### **The University of California**

UC DAVIS IS ONE of nine campuses of the University of California, which was chartered as a land grant college in 1868 and now constitutes the pre-eminent system of public higher education in the country. Together, the nine campuses have an enrollment of more than 157,000 students, 90 percent of them California residents. Some 150 laboratories, extension centers, research and field stations strengthen teaching and research while providing public service to Califor-

nia 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.

Founded in 1905 as the University Farm, where students from the first UC campus in Berkeley learned the latest in agricultural methods and technology, UC Davis today offers a full range of undergraduate and graduate programs, along with professional schools of law, management, medicine and veterinary medicine. Our agricultural roots are still honored, however, in our nickname—the “Cal Aggies.”

UC Davis is the largest of the nine University of California campuses, with 5,200 acres, second in total expenditures and third in enrollment. UC Davis stands 22nd in research funding among universities in the United States, according to the most recent information from the National Science Foundation. For the third consecutive year, *U.S. News & World Report* ranked UC Davis among the top 10 public universities nationally.

UC Davis is one of only 62 universities admitted to the prestigious Association of American Universities.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering and Letters and Science. Undergraduate enrollment is more than 19,000 students. Graduate Studies administers graduate study and research in all schools and colleges. Professional studies are carried out in the schools of law, management, medicine and veterinary medicine; more than 5,100 students are engaged in graduate or professional study. Located off-campus are numerous labora-



ories, extension centers and facilities, including the UC Davis Medical Center in Sacramento, the Veterinary Medicine Teaching and Research Center in Tulare, Bodega Marine Laboratory at Bodega Bay, the College of Engineering's Applied Science Department at Livermore, and the UC Davis Washington Center in Washington, D.C.

### A Small-Town Setting

DAVIS IS SURROUNDED by open space—including some of the most valuable agricultural land in the state. Outdoor sports enthusiasts will find many beautiful recreational areas within a 70-mile drive from campus: the American River, Clear Lake, Lake Berryessa, the Napa and Sonoma valleys and the historic Mother Lode country. The Sierra Nevada, Lake Tahoe ski resorts and coastal areas of Mendocino and Monterey are about 150 miles from Davis.

If you prefer city life, Sacramento, the state capital, is 15 miles to the east, and San Francisco is just 72 miles to the southwest. Both cities offer music, the ballet, professional sports, theater and other entertainment.

For long-distance travel, Davis has a Greyhound bus terminal and an Amtrak station. If you travel by plane, the Sacramento Metropolitan Airport is an easy 20-minute drive from downtown Davis. Within Davis, bicycles are a favorite mode of transportation. The terrain is flat and 50 miles of bike paths crisscross the city. With more bicycles per capita than any other city in the nation, Davis has earned the title "City of Bicycles."

Winters in Davis are generally mild. It rarely snows, but you should get good use from your rainwear. Summers are sunny, hot and dry. Although on some days the thermometer can exceed 100 degrees, summer days are usually in the low 90s, with overnight temperatures in the 60s. Spring and fall weather is some of the most pleasant in the state.

### The City of Davis

ECOLOGICALLY AWARE and socially innovative, Davis has a small-town friendliness and spirit of volunteerism that distinguish it from cities of similar size. Residents are active in local, national and international political causes, in the arts, and in community organizations ranging from Little League to the Rotary Club.

Students compose a large portion of the city's population of 53,000, making Davis one of the state's few remaining college towns. You'll find an abundance of bookshops, coffee houses and restaurants catering to students in the bustling downtown area adjacent to campus.

Though closely linked to the university, the city maintains a strong identity of its own. The Davis Art Center,

Davis Comic Opera Company, Davis Musical Theatre Company and several local galleries provide creative outlets for people in the community and supplement the cultural events presented by the university.

The city has long recognized the importance of open space in maintaining its small-town atmosphere and has created 31 city parks offering a variety of attractions: tennis courts, playgrounds, swimming pools, playing fields and even a skateboard facility.

### Campus Life

LIKE THE CITY of Davis, the campus has a relaxed atmosphere, with plenty of open space, trees and lawns. Even as the student population grows, the campus continues to maintain its informal, friendly ambience.

Underlying the casual style of Davis students, however, are a fundamental seriousness and a dedication to academic excellence. Davis students do study hard. After your studying is done, however, you can relax at a movie, public lecture, dance recital or concert. For the energetic, intercollegiate sports, club sports and one of the largest intramural programs in the country offer athletics for fun or competition. UC Davis' reputation for producing outstanding student athletes was reinforced this past spring when the men's basketball team won the National Collegiate Athletic Association Division II championship—just one of several sports in which Aggies excel.

Davis welcomes the exchange of opinions and ideas and is committed to advancing the diversity of its students, faculty, staff and administrators. UC Davis' commitment to a learning environment characterized by mutual respect and understanding is reflected in the "Principles of Community," reprinted on the next page.

## VISITING THE CAMPUS

Information:  
Visitor Services Office  
Buehler Alumni and Visitors Center  
530-752-8111

YOU ARE WELCOME to pay us a visit. Weekend tours depart from the Buehler Alumni and Visitors Center at 11:30 a.m. and 1:30 p.m. No appointment is necessary. For weekday individual or group campus tours, contact the Visitor Services Office at least one week in advance. If you have questions about application procedures or entrance requirements, write or visit Undergraduate Admissions and Outreach Services in Mrak Hall.




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*We're the  
1998 NCAA  
Division II  
men's  
basketball  
champions!*

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## University of California, Davis

# Principles of Community

**T**HE 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:

**W**E 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.

**W**E 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.

**W**E 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.

**W**E 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 Staff Assembly, the UCDCM Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.

## THE UNDERGRADUATE COLLEGES

### The College of Agricultural and Environmental Sciences

Information:  
College Office  
228 Mrak Hall  
530-752-0108; <http://www.aes.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 biological, social and physical 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 biology, and human health and well-being. 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 Engineering

Information:  
Dean's Office  
1050 Engineering II  
530-752-0557; <http://www.engr.ucdavis.edu>

The College of Engineering is the largest undergraduate engineering college in the University of California system, with an undergraduate enrollment of approximately 2,500 and graduate enrollment of 700. The college offers both a friendly atmosphere and the varied academic programs in basic sciences and engineering that have made UC Davis engineering graduates highly valued in private practice and research. The college has seven departments; each has outstanding programs of instruction.

- The **Department of Applied Science** instructs engineering graduate students in broad areas of scientific technology.
- The **Department of Biological and Agricultural Engineering** combines study in engineering with instruction in the biological processes used to solve challenging environmental and technical problems.
- The **Department of Chemical Engineering and Materials Science** offers curricula integrating knowledge of chemistry, biological sciences or materials science engineering that enable students to solve problems in both current and future manufacturing technologies or to analyze the structure, properties and behaviors 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. As an incoming student, you will be given the name and office hours of your departmental staff adviser; you should arrange an appointment as soon as you arrive on campus. A well-developed peer advising system supplements the departmental advisers.

Undergraduate education in engineering at UC Davis serves as a sound basis for beginning professional prac-



tice in engineering design and development, as a preparation for careers in corporate or governmental operations or as a foundation for graduate study. To these ends, the college emphasizes fundamental sciences to give students the maximum postgraduate flexibility. Technological developments in recent years have made it clear that engineering education must be based on fundamentals or rapidly become obsolete.

Engineers will continue to face new challenges as society demands improvements in the quality of life, and as our state and nation demand greater participation by engineers in efforts toward competitiveness in a global market. As a unit in a land-grant institution, the UC Davis College of Engineering must help maintain the technological leadership long enjoyed by the United States, while advancing technology for the benefit of all.

### The College of Letters and Science

Information:  
Office of the Deans  
200 Social Sciences and Humanities Building  
530-752-0392; <http://www-lsdo.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 three 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—and the affiliated intercollege Division of Biological 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 the skills of written communication.

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 **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, student peer advisers and professional staff advisers who are available for individual consultations with undergraduates in a variety of settings, from the deans' 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

Information:  
Office of Graduate Studies  
250 Mrak Hall  
530-752-0650;  
<http://pubweb.ucdavis.edu/documents/gradstudies/homepage.htm>

Graduate students at UC Davis have the 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 more than 70 graduate programs leading to master's or doctoral degrees, which together enroll more than 2,800 graduate students. Many of Graduate Studies' programs are offered through graduate groups, an interdisciplinary concept that allows students to study and work in inter-related areas to broaden their intellectual experiences. See the Graduate Studies chapter.

### PROFESSIONAL STUDY

UC Davis has three professional schools—the School of Law (J.D.), the School of Medicine (M.D.) and the School of Veterinary Medicine (D.V.M., M.P.V.M.)—and the Graduate School of Management offers the M.B.A. degree. These schools and programs are described in later chapters.



## ACADEMIC RESOURCES

### The University Library

Information:

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 Library, the Loren D. Carlson Health Sciences Library, the Agricultural and Resource Economics Library and the Medical Center Library in Sacramento. The combined collections of the various General Library facilities total more than 2.6 million volumes, and more than 41,000 periodical and journal titles are received annually. An extensive variety of government documents, maps, microfilms and CD-ROMs 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 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. The library at the UC Davis Medical Center provides a clinical collection of 25,000 volumes. A law library, administered by the School of Law, is located in King Hall.

The MELVYL® System, an online catalog of books and journals, can be used to access the collections of UC Davis and the other eight UC campuses. The MELVYL System can be searched in the libraries, at campus computer laboratories, and remotely with a modem and on the Internet. The libraries also offer access to databases and numerous other electronic resources, both on site and via UCD Network. Terminals with Internet access are available for patron use in all of our facilities.

Information about library services, new full text electronic databases, important subject-specific World Wide Web sites and a current schedule of free library classes on the use of MELVYL and the Internet is available at the library's Web site. Librarians are also available for consultation on resources for research projects.

### UC Davis Arboretum

Information:

Arboretum Headquarters

530-752-2498; <http://arboretum.ucdavis.edu>

The 95-acre UC Davis Arboretum, located along Putah Creek's historic north fork, maintains a documented collection of more than 4,000 different kinds of trees, shrubs and perennials for use in teaching and research. Outstanding plant collections include the Shields Oak Grove, the Mary Wattis Brown Garden of California native plants, the Ruth Storer Garden of flowering perennials and small shrubs, and the T. Elliot Weier Redwood Grove. The arboretum program of seed exchange, international in reputation, serves to distribute California native plants throughout the world and has provided the university with numerous exotic plant specimens. Internships are available in nursery management, landscape design and maintenance, environmental education, conservation biology, Integrated Pest Management (IPM) and Geographic Information Systems (GIS).

### Information Technology

Information:

I.T. Express

First Floor, Shields Library

530-754-HELP (754-4357); [ithelp@ucdavis.edu](mailto:ithelp@ucdavis.edu);

<http://it.ucdavis.edu>

The Division of Information Technology (I.T.) provides computing, communications and media resources and services in support of research and instruction. The Network 21 project is installing a high-speed fiber-optic infrastructure that will enable UC Davis to participate in Internet 2, which will connect research institutions across the nation.

Every UC Davis student is issued a free campus e-mail account, which is required for many computing services, including use of computer classrooms. Computer classrooms provide access to the Internet and a range of software programs in use in UC Davis courses. Classrooms are available on a drop-in basis when not being used for instruction (TB 114 is reserved solely for drop-in use). Multimedia labs provide access to media production and editing equipment.

At I.T. Express, you can activate your e-mail account, consult with staff about the various information technologies used at UC Davis, make use of copy services, and pick up publications on computing and information technology.

I.T. Training offers free computer workshops, technology presentations, self-paced technology training materials on topics ranging from word processing and databases to desktop publishing, and on-line training materials. Creative Communications Services offers audio-visual equipment loan; photographic, digital imaging, and graphic services; and copy services. The Center for Advanced Information Technology will help you evaluate computer systems and software.

Students who have their own computers may purchase Bovine Online, a comprehensive Internet software package, at the UCD Bookstore or I.T. Express, or download the programs for free. UC Davis contracts with a number of software vendors to make widely used programs available to all UC Davis affiliates at minimal or no cost.

ResNet, the residence hall computer network, will extend to all UC Davis residence halls in 1998-99 and allow residents with computers to connect directly to the campus network. Students living off campus need a modem to access the campus network. The campus modem bank can provide only limited access, so some students opt to connect via an Internet Service Provider.

Information about I.T.'s many services, including computer classroom locations and hours, IT Express hours, training classes and materials, is available at I.T.'s extensive Web site.

## 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 or division.

### Agricultural History Center

Information:  
5202 Social Sciences and Humanities Building  
530-752-1827

The center coordinates and administers several research and publication programs that further the study of agricultural and natural-resource history. Research activities include studies of comparative farm policy, migration and agricultural development, the history of farm land values, the agricultural-environmental border, rural international borderlands in the Americas, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the 19th and 20th centuries, and the impact of scientific research.

### Bodega Marine Laboratory and Reserve

Information:  
Bodega Marine Laboratory  
P.O. Box 247  
Bodega Bay, CA 94923  
707-875-2211; 707-875-2089 (fax); [ucdbml@ucdavis.edu](mailto:ucdbml@ucdavis.edu);  
<http://www-bml.ucdavis.edu>

The Bodega Marine Laboratory is dedicated to research and teaching in marine biology and related fields. Research areas include population biology/ecology, cell and developmental biology, and aquaculture and fisheries. Well-equipped facilities feature running seawater in two classrooms and most laboratories, a marine science library, lecture hall, housing facilities, greenhouses, experimental freshwater system for anadromous fish studies, and a dive locker and air station. Faculty teach a number of undergraduate courses during the acade-

mic 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 Regional Primate Research Center (CRPRC)

Information:  
Primate Center  
530-752-0447;  
<http://www.crprc.ucdavis.edu/crprc/homepage.html>

The California Regional Primate Research Center investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral and neurobiology, developmental and reproductive biology, respiratory diseases, virology and immunology, genetics and a variety of biomedical collaborative research projects. Self-sustaining breeding colonies of macaques, squirrel and titi monkeys are available for study of spontaneously occurring disorders.

### Center for Geotechnical Modeling

Information:  
119 Everson Hall  
530-752-6986; <http://www.engr.ucdavis.edu/~cgm/>

At the Center for Geotechnical Modeling, students and faculty from several departments and other universities conduct research in physical and numerical modeling of geotechnical problems. The center operates two centrifuges, including the 9-m radius, 4,500-kg payload National Geotechnical Centrifuge. These centrifuges are used to study a variety of topics, including the effect of earthquakes on earth structures, toxic waste transport in groundwater, and deformations of foundations of bridges and large buildings.

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*Television news reporters covered the story when UC Davis researchers uncovered the genetic origins of Cabernet Sauvignon.*

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### **Center for Image Processing and Integrated Computing**

Information:

Bernd Hamann and David Rocke  
530-752-2387; 530-752-8894 (fax);  
<http://info.cipic.ucdavis.edu>

The Center for Image Processing and Integrated Computing focuses on data analysis, visualization, computer graphics, optimization, and electronic imaging. The central emphasis is the investigation of techniques for the study of large-scale, multi-dimensional data sets. These techniques may be applied to the analysis and visualization of environmental, geophysical, astrophysical, biological, fluid flow, and satellite data. The center seeks to solve complex data analysis and visualization problems in a cross-disciplinary environment, working with researchers in academia, national research laboratories and industry.

### **Crocker Nuclear Laboratory**

Information:

Crocker Nuclear Laboratory  
530-752-1460

This facility is an interdepartmental laboratory for the application of nuclear science to a variety of disciplines. The laboratory has research programs in nuclear physics and chemistry, air pollution analysis, use of pulsed ultraviolet light as an alternative to pesticides and insecticides, biology, material damage studies, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging.

### **Institute of Governmental Affairs**

Information:

Shields Library  
530-752-2042; <http://polar.ucdavis.edu/igahome.html>

The Institute of Governmental Affairs (IGA) serves as a research base for social science faculty in eight departments on campus and for visiting scholars from throughout the world. IGA houses five formal research programs: Center for State and Local Taxation; Joint Center for International and Security Studies; Program on Immigration, Population and the Economy; Program on Pacific Rim Business and Development; Program on Telecommunications Policy; and the Undergraduate Fellows Research Program. The institute provides specialized services, including grant advising, preparation and administration; academic program development; library and data services; social science computing, programming and statistical consulting; seminar, workshop and conference organization. IGA enhances the education of undergraduate and graduate students by providing research opportunities and by exposure to its public affairs programs.

### **Institute of Theoretical Dynamics**

Information:

2201 Academic Surge Building  
530-752-0938; [info@itd.ucdavis.edu](mailto:info@itd.ucdavis.edu); <http://itd.ucdavis.edu/>

The institute promotes research and graduate education in the mathematical sciences and provides a focus for extramural and intramural research pursuits. The two most important research themes are dynamics and stochastic processes. Approximately 30 faculty from all of

the colleges participate in conferences, workshops, seminars and summer schools. The institute provides networking of computer workstations, a gateway to supercomputers, research offices and facilities for interaction with students, faculty and visitors. The institute supports research in mathematical biology, mathematical physics and applied mathematical analysis, especially fluid dynamics, and houses the NSF Computer Graphics Facility for computational biology, which is open to faculty, graduate students and postdoctoral researchers for graphic visualization in biology. The institute also coordinates a campuswide NSF research training group, "Nonlinear Dynamics in Biology."

### **Institute of Toxicology and Environmental Health (ITEH)**

Information:

Institute of Toxicology and Environmental Health  
530-752-1340

ITEH coordinates interdisciplinary research on biomedical and toxicological problems related to exposure to chemical, physical and biological toxic agents or to ionizing radiation. This research aims to determine basic mechanisms of toxic effects and to predict hazards to human and animal health from continual exposure to realistic levels of toxic substances in the environment or at the workplace. 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 institute houses a major universitywide program and federally funded center in occupational medicine and a School of Medicine program in reproductive biology.

### **Institute of Transportation Studies**

Information:

Daniel Sperling  
530-752-6548; 530-752-6572 (fax); [dsperling@ucdavis.edu](mailto:dsperling@ucdavis.edu);  
<http://www.engr.ucdavis.edu/~its>

The institute 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 advanced vehicle and highway systems, travel behavior, electric vehicle technology and policy, and energy and environmental projects. About 25 faculty members and 70 students from more than 10 academic disciplines, including the departments of Civil and Environmental Engineering and Mechanical Engineering, Economics, Environmental Science and Policy, Agricultural and Resource Economics, and the Graduate School of Management, participate in the research activities of the institute. The institute also houses the Graduate Group in Transportation Technology and Policy.

### **John Muir Institute of the Environment (JMIE)**

Information:

Robert G. Flocchini  
530-752-1460

The institute facilitates research and exchange of information to improve the scientific basis for decisions on environmental issues. It encourages and facilitates mul-

tidisciplinary research focused on environmental topics, acts as administrative coordinator for specific programs of organized environmental research, and facilitates communication among policy makers, resource agencies, academic scientists and the public through outreach programs.

### **Program in International Nutrition**

Information:  
Kenneth H. Brown  
3150 Meyer Hall  
530-752-1992; 530-752-3406 (fax); khbrown@ucdavis.edu;  
<http://www-nutrition.ucdavis.edu/pin/index.htm>

Faculty members of the Program in International Nutrition are studying the epidemiology and causal mechanisms of the major nutritional problems of human populations in developing countries, with the ultimate objective of planning, implementing, and evaluating programs to ameliorate these problems. Current areas of research emphasis include maternal and child nutrition, nutrition and infection, nutritional assessment, and food and nutrition policy. The program manages a small microcomputer center for the analysis of clinical and population-based studies of relevance to international nutrition.

### **Additional Research Centers and Resources**

#### **Adult Fitness Program**

Information:  
Department of Exercise Science  
530-752-2540

The Adult Fitness Program serves as an educational laboratory for undergraduate and graduate students engaged in advanced study of the role of exercise and nutrition in the management of optimal physiological function. Basic and clinical research studies focus on cardiovascular, respiratory and metabolic functions. The program emphasizes risk reduction for cardiovascular disease and development of cardiorespiratory endurance. Studies stress fitness, relaxation, and weight reduction and control through appropriate diet and exercise programs that are individually prescribed after extensive medical and physiological testing.

#### **California Agricultural Experiment Station**

Information:  
College of Agricultural and Environmental Sciences  
530-752-1610

The California Agricultural Experiment Station has branches in Davis, Riverside and Berkeley. The Davis branch includes 500 faculty in more than 30 departments in the College of Agricultural and Environmental Sciences, the Division of Biological Sciences and the School of Veterinary Medicine. In addition to laboratory facilities, it has approximately 3,000 acres devoted to

agricultural research in the areas of experimental crops, orchards and animal facilities. The Experiment Station facilitates research in agricultural production, food processing, nutrition, animal care and disease prevention, consumer sciences and community development and environmental quality, with emphasis on resource conservation and management, water and soil pollution and regional planning.

#### **Center for Child and Family Studies**

Information:  
West House of Child and Family Study Center  
530-752-2888; <http://ccfs.ucdavis.edu>

The Center for Child and Family Studies is 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 laboratory, students enrolled in human development courses develop observational techniques and participate with peers, children, parents and professionals in a fully integrated laboratory of developmental programs for young children. Students study theories of development in a naturalistic setting, linking theory to principles of interaction and developing a recognition and respect for individual differences. Selected undergraduate students participate in faculty and graduate student research at the laboratory.

#### **Center for Neuroscience**

Information:  
Edward G. Jones, Director  
1544 Newton Ct.  
Davis, CA 95616  
530-757-8708; 530-757-8827 (fax);  
<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. A core group of cognitive neuroscientists uses various imaging techniques and electrophysiological techniques to study both the normal and lesioned cortex to increase their understanding of how the normal brain produces behavior. Four faculty members use animal models to understand how information is processed in the cortex.

#### **Facility for Advanced Instrumentation**

Information:  
9 Hutchison Hall  
530-752-0284

The Facility for Advanced Instrumentation is a training and research center where students, faculty and staff have access to major scientific instruments. An electron microscope laboratory houses scanning and transmission electron microscopes with x-ray microanalytical capabilities and an atomic force microscope. A mass spectrometer laboratory consists of a research-grade GC/MS, a high resolution instrument, and an HPLC/MS equipped with electrospray ionization for analysis of





proteins and peptides. The facility also coordinates access to additional instruments located in other departments on campus.

### **Food Intake Laboratory**

Information:  
TB 33  
530-752-7516

The Food Intake Laboratory supports predoctoral and postdoctoral research in nutrition and behavior, emphasizing studies on the control of food intake and the nature of the factors that govern feeding choices. The laboratory promotes collaborative research involving the roles of metabolic, psychological, neurochemical, hormonal, gender, genetic and sensory inputs in the feeding behavior of experimental animals.

### **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**

Information:  
Buildings H and J—ARS  
530-752-7756

Animal Surgery Laboratory provides facilities in compliance with NIH/AAALAC standards for researchers who perform both survival and non-survival experimental animal surgeries.

- **Biochemistry and Special Instrumentation Laboratory**

Information:  
TB 161  
530-752-0320

This central facility provides investigators access to certain common but expensive laboratory equipment, including ultracentrifuges and high-speed centrifuges with rotors, scintillation and gamma counters, UV/VIS spectrophotometers, densitometers, Betaplate and Elisa readers.

### **Human Performance Laboratory**

Information:  
164 Hickey Gym  
530-752-0965/530-754-8675

The Human Performance Laboratory houses equipment for the study of blood and muscle chemistry and enzymology, metabolism and energetics, muscle mechanics and electromyography, movement kinetics and kinematics, body composition and anthropometry, cardio-respiratory function during exercise in a controlled environment, control and acquisition of motor skills and the psychosocial aspects of human performance. The laboratory has Apple Macintosh and IBM micro-computers that can be used for data collection, reduction, graphing and statistical analysis as well as for biomechanical, physiological systems and human performance modeling.

### **Humanities Institute**

Information:  
2223 Social Sciences and Humanities Building  
530-752-2295; 530-752-4263 (fax)

The Davis Humanities Institute organizes interdisciplinary research seminars open to graduate students and faculty and promotes creative exchanges among the humanities, social sciences and environmental sciences. Its fellowship program enables campus fellows and distinguished visitors to participate in year-long seminars on designated themes. The seminar theme in 1998-99 will be "Migrations to, from and within the Americas." The institute also sponsors distinguished visiting lecturers, supports interdisciplinary research clusters and a graduate student research assistantship program, co-sponsors lectures with other departments, organizes a Friday noon series of talks and films entitled "Problems and Paradigms," produces a calendar of events and publishes a newsletter, *Humanities at Davis*.

### **Intercampus Institute for Research at Particle Accelerators**

Information:  
Richard L. Lander  
325 Physics/Geology Building  
530-752-1780

This institute conducts research using the unique facilities at national and international accelerator laboratories, particularly the Enrico Fermi National Accelerator Laboratory and the Large Hadron Collider to be built in Europe. High-energy particle physics is the dominant area of research. The institute also promotes seminars and lectures by visiting researchers.

### **Mann Laboratory**

Information:  
104 Mann Laboratory  
530-752-1410; 530-752-4554 (fax)

Plant scientists in the Louis K. Mann Laboratory direct their physiological, biochemical and molecular research to improving the quality of harvested fruits, vegetables and seeds. The five faculty housed in this facility are members of the Department of Vegetable Crops and are assisted by numerous students, postdoctoral researchers and visiting scientists. Research ranges from the basic molecular biology of fruit ripening and seed development to practical storage technologies for lightly processed fruits and vegetables. Results are communi-

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**Students ride  
free on  
Unitrans,  
the  
student-run  
transporta-  
tion service  
with routes  
covering all  
of Davis.**

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cated to other researchers and to growers, shippers, marketers and consumers. The facility is equipped with 18 controlled-temperature rooms, seven research laboratories, a teaching laboratory and a conference room and library.

### Natural Reserve System

Information:  
Office of Research  
410 Mrak Hall  
530-752-6949; <http://www.ucop.edu/DANR/nrs/nrs.html>

The Davis campus administers seven natural 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 above.)
- Eagle Lake Field Station is on the shore of Eagle Lake in northeastern California and has boats, a small laboratory and facilities for overnight and longer stays.
- Jepson Prairie Reserve, located in Solano County 15 miles south of the campus, consists of native California bunchgrass grasslands and vernal pools.
- Donald and Sylvia McLaughlin Reserve, located near Clear Lake about 70 miles northwest of campus, consists of intercoastal range habitat and serpentine soil habitat.
- Putah Creek Campus Reserve is a 150-acre corridor along the north bank of Putah Creek with a remnant of the riparian (streamside) ecosystem.
- Quail Ridge Reserve consists of intercoastal range habitat located about 25 miles west of campus on a peninsula jutting into Lake Berryessa. The reserve has a small facility plus camping for overnight stays.
- Stebbins Cold Canyon Reserve, located about 24 miles west of campus, consists of several different plant communities found in California's inner and outer coast ranges.

The university maintains over 30 reserves throughout the state, many of which are available for teaching and research.




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**Agricultural engineer John Mills studies the ergonomics of vineyard tasks to reduce stress on workers' backs and wrists.**

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### Nuclear Magnetic Resonance Facility

Information:  
Medical Sciences 1D  
530-752-7677

The Nuclear Magnetic Resonance Facility provides qualified researchers in the biological, medical and physical sciences access to state-of-the-art NMR instrumentation for spectroscopy and imaging. At present, the facility operates six spectrometers of varying purposes and capabilities. Three horizontal magnet bore spectrometers are used for in vivo spectroscopy and imaging of small animals and materials, and in vitro spectroscopy of perfused organs. Two vertical bore spectrometers are used primarily for solution studies of biomolecules, with an additional vertical bore instrument for in vitro studies. All of the spectrometers are multinuclear, and a large variety of high resolution, surface and imaging coils are available for use. The facility also has SUN and Silicon Graphics workstations for off-line data processing and molecular modeling.

### Protein Structure Laboratory

Information:  
1145 Surge 1  
530-752-6228

The Protein Structure Laboratory provides state-of-the-art biotechnological instrumentation for protein sequencing, amino acid analysis, and protein and DNA synthesis and consultation for protein-related research. Also available are a micro-protein sample preparation (in-gel and on-membrane digestions) and various analyses (amino acid analysis, sequencing, peptide mappings and MS analysis) for protein identification.

### Social Science Data Service

Information:  
107 Social Sciences and Humanities Building  
530-752-6063; <http://polar.ucdavis.edu/Welcome.html>

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

### Student Experimental Farm

Information:  
Student Experimental Farm  
530-752-7645

The Student Experimental Farm is an innovative teaching and research facility located on 25 acres of university land just west of the Recreation Pool. Since its inception, the Student Experimental Farm has provided students with unique opportunities to explore alternative agricultural technologies and philosophies through classes, special projects, internships, work study jobs and original research. Because the farm includes several acres of land that have been managed organically for two decades, it provides researchers with a facility for conducting field research into sustainable agriculture.



## UC Agricultural Issues Center

Information:  
132 Social Sciences and Humanities Building  
530-752-2320; <http://aic.ucdavis.edu>

The UC Agricultural Issues Center, headquartered at Davis, is a universitywide research and outreach unit that draws on expertise from many disciplines. The center focuses on issues related to science and technology, international trade, agribusiness trends, rural-urban interrelations, resources and the environment, human resources and commodity policy and markets.

## UC Davis Herbarium

Information:  
Section of Plant Biology  
530-752-1091/0617; <http://herbarium.ucdavis.edu>

The UC Davis Herbarium is used for research in plant systematics and ecology, as well as for public service requests (especially identification of weeds and poisonous plants). The herbarium contains more than 200,000 plant specimens, including 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.

## Veterinary Genetics Laboratory

Information:  
Horse Bloodtyping Laboratory, Armstrong Tract, 530-752-2211  
Cattle Bloodtyping Laboratory, Armstrong Tract, 530-752-7383

The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities include studies of the genetic basis of animal diseases, development of DNA marker screening tests and gene mapping. Knowledge acquired is applied to genetic disease diagnostics and parentage verification for domestic animals (horses, cattle, sheep, goats, elk, llamas, alpacas and dogs) and wildlife.

## Veterinary Medicine Teaching and Research Center (VMTRC)

Information:  
UC Davis VMTRC  
18830 Road 112  
Tulare, CA 93274  
209-688-1731; <http://www.vmtre.ucdavis.edu>

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 medicine. VMTRC programs emphasize herd health medicine, epidemiology and preventive medicine, production management, agricultural economics, environmental protection, food safety and animal welfare.

## Water Resources Center

Information:  
1323 Academic Surge  
530-752-8070

The center supports water-related research in such areas as agricultural and biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences and political science. Research interests include drought responses, aquatic ecosystem structure and function, water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resources development, environmental and energy relationships in water resources management, watershed hydrology, ground water use, water re-use, soil and land use management in relation to water resources use, and maintenance and improvement of water quality. The center has an annual call for proposals in fall quarter.

## Wildland Resources Center

Information:  
1323 Academic Surge  
530-752-8070

The center coordinates activities among the university's research and extension programs and stimulates research into conservation, management and utilization of wildland resources with a view toward the optimum present and future uses of wildlands. Projects focus on such topics as habitat conservation, assessment and management of timber resources and old-growth forests, and development of a system for evaluating California's environmental resources. The center increases the awareness of the university's research and extension programs related to wildlands and serves as liaison between the university and state and federal agencies and other organizations concerned with wildland resources and problems.

## X-Ray Crystallographic Facility

Information:  
Marilyn Olmstead  
Department of Chemistry  
530-752-6668

The X-Ray Crystallographic Facility is located in the Department of Chemistry. There are three automated four-circle diffractometers. One of these is equipped with a Siemens 15-kW rotating anode X-ray source. There are also traditional Weissenberg and precession cameras. All diffraction equipment is fitted with low-temperature (liquid nitrogen) attachments. In addition, the facility contains a Silicon Graphics Indigo 2, two VAX-station 3000 series computers, microcomputers, graphics terminals and multi-pen plotters. The laboratory is known for pioneering work in low-temperature crystallography, for the development of rapid structure determination methods, and techniques for handling reactive materials.





**UNDERGRADUATE  
ADMISSION**

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# UNDERGRADUATE ADMISSION

Information:  
Undergraduate Admissions and Outreach Services  
178 Mrak Hall  
One Shields Avenue  
Davis, CA 95616-8507  
530-752-2971; 530-752-4360 (TTY), 530-752-1280 (fax);  
undergradadmissions@ucdavis.edu;  
http://www.ucdavis.edu/admissions.html

You can apply via the World Wide Web at <http://www.ucop.edu/pathways>. The *Application for Undergraduate Admission and Scholarships* can also be obtained from the counseling office of any California high school or community college or from the admission office of any UC campus.

### Application Filing Periods

Submit your application for admission and scholarships during the filing period for the quarter in which you want to attend UC Davis.

| Quarter of Attendance | Filing Period       |
|-----------------------|---------------------|
| Winter quarter 1999   | July 1–31, 1998     |
| Spring quarter 1999   | October 1–31, 1998  |
| Fall quarter 1999     | November 1–30, 1998 |

Submit your completed application form to:

University of California  
Undergraduate Application Processing Service  
P.O. Box 23460  
Oakland, California 94623-0460

*For winter and spring quarters at UC Davis, you will need to submit a completed application with fee and appeal letter directly to Undergraduate Admissions and Outreach Services.*

### Application Fees

The application fee of \$40 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 \$40 for each campus you select. These fees are not refundable. You must include the fee with the application or it will not be processed. Attach a check or money order made payable to the Regents of the University of California to the application form.

### Preparing for University Work—Freshman

A carefully planned program of high school courses provides you with the best preparation for university work. As a prospective university student, you should give priority to completing the high school courses required for admission—known as the “A to F” subject requirements.

You should take college preparatory courses that will challenge you to work hard and will prepare you beyond minimum levels of competence in reading, writing and mathematics. A student who is well prepared for university work will have taken four years of English in high school, four years of mathematics, two to three years of foreign language, two to three years of laboratory science, two or more years of history/social science, and one or more years of art or humanities.

**Reading:** You should become proficient in reading and understanding technical materials and scholarly works.

Learn to read analytically and critically, actively questioning yourself about the author’s intentions, viewpoint, arguments and conclusions. Become familiar and comfortable with the conventions of standard written English, and with various writing strategies and techniques. Your reading experience should include original works in their entirety, not just textbooks and anthologies, and should encompass a wide variety of forms and topics.

**Writing:** Effective critical thinking and proficiency with the written language are closely related, and both are skills that every university student must master. By university standards, a student who is proficient in English composition is able to understand the assigned topic; select and develop a theme by analysis and argument; choose words that aptly and precisely convey the intended meaning; construct effective sentences, i.e., sentences that economically and successfully convey the writer’s ideas and display a variety of structures; and demonstrate an awareness of the conventions of standard written English.

If you plan to attend the university, you must take English courses in high school that require the development and practice of these skills. You must take at least four years of English composition and literature classes that stress expository writing.

**Mathematics:** Many undergraduate majors require preparation in mathematics beyond the three years required for admission to the university. All majors in the natural and life sciences, engineering and mathematics require calculus. Many majors in the social sciences require statistics or calculus, or both. Calculus is also required for undergraduates preparing for careers in the environmental sciences, dentistry, medicine, optometry, pharmacy and biostatistics. If you select a major that requires either calculus or statistics, you should expect to take that course during your first year at the university.

Prepare yourself for university courses in mathematics while you are still in high school. Good preparation includes a year of mathematics beyond second-year algebra (such as precalculus, mathematical analysis, analytic geometry) and definitely a course in mathematics during your senior year.

Algebra is necessary for success in university mathematics courses. Students who do not take a mathematics course during their last year in high school often find they need to take a preparatory course at the university in order to renew their algebra skills. The need to take such a course at the university could delay your undergraduate studies that require mathematics as a prerequisite.

Finally, take advantage of any guidance your high school offers in study skills and diagnostic tests designed to help you assess your preparation for col-



lege. Managing your time well and studying effectively are critical to excelling at the university. Together with solid academic preparation, these skills should enable you to realize your educational goals and, ultimately, fulfill your career aspirations.

## ADMISSION AS A FRESHMAN

The University of California defines a *freshman applicant* as a student who has graduated from high school but has not enrolled since then in a regular session in any college-level institution. Summer session immediately following high school graduation is excluded in this determination.

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

The following describes the minimum requirements to establish eligibility at the University of California. **At UC Davis, students generally must perform well above these minimums in order to gain admission**, since the number of eligible applicants exceeds the number of students we can admit. We give priority to students on the basis of highest academic achievements and test scores.

### Minimum Requirements for California Residents

To be minimally eligible for admission to the University of California as a freshman, you must meet the subject requirements, scholarship requirement and examination requirements that are described on this and the following pages.

#### Subject Requirements: A to F

You must complete at least 15 high school units in the subject areas listed below. At least seven of the required 15 units will have to be taken in the last two years of high school. The required course sequence is often referred to as the “A to F” pattern.

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

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—4 years

Four years of English—composition and literature. Classes should stress preparation for university study, including frequent and regular practice in writing expository prose compositions of some length. Not more than one year will be accepted from the 9th grade. (See English Proficiency below.)

#### C. Mathematics—3 years; 4 years recommended

Three years of mathematics—elementary algebra, geometry and intermediate algebra. (Courses taken in



grades 7 and 8 may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

#### D. Laboratory Science—2 years; 3 years recommended

Two years of laboratory science providing fundamental knowledge in at least two of these three areas: biology, chemistry and physics. Not more than one year of laboratory science taken in the 9th grade may be used to meet this requirement.

#### E. Language other than English—2 years; 3 years recommended

Two years of the same language other than English. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading and composition. (Courses taken in grades 7 and 8 may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

#### F. College Preparatory Electives—2 years

Two years in addition to those required in “A” through “E” above.

- **History and English:** courses that fit the general description for courses above.
- **Advanced mathematics:** trigonometry, linear algebra, pre-calculus (mathematical analysis), calculus, statistics, computer science and similar courses. (Courses containing significant amounts of material for arithmetic or from shop, consumer or business mathematics are not acceptable.)
- **Laboratory science:** courses in the biological and physical sciences. A general science course taken in grade 9 as preparation for a laboratory science may be used.
- **Language other than English:** courses may be in either the same language used to satisfy the “E” requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.
- **Social science:** courses that serve as preparation for lower division work in social science at the university. (Courses of an applied, service or vocational nature are not acceptable.)
- **Visual and performing arts:** courses should enable you to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

If you are a California high school graduate, the courses used to satisfy the **Subject Requirement** must appear on a list that your high school principal has certified meets the course descriptions above, and has been accepted by



the university's Office of Student Academic Services. If you submit courses from an out-of-state school, Undergraduate Admissions and Outreach Services will determine if your courses fulfill the Subject Requirement.

### English Proficiency

Instead of a fourth year of high school English, you may satisfy the **English Proficiency Requirement** by completing one of the following:

- SAT II Subject Test in Writing (a score of 660 or above);
- OR**
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, or 3).

### OR

- International Baccalaureate Higher Level Examination in English (a score of 7, 6 or 5).

The requirement may also be satisfied with a transferable college-level English course in literature or composition worth 3-semester or 4-quarter units in which you earned a grade of C or higher.

### Scholarship Requirement

You must have earned a grade of C or better in all high school courses to satisfy the "A to F" requirements above. The grades earned in these courses that are taken in grades 10 through 12 will be used to evaluate your grade point average for minimum eligibility.

If you attain a grade point average of 3.30 (where the letter grade A=4, B=3, C=2, and D=1, and in university-approved honors or advanced placement courses taken during the 10th, 11th and 12th grades [limit of four year-long courses with not more than two coming from the tenth grade] where the letter grade A=5, B=4, and C=3) in the required "A to F" subjects taken after the 9th grade, you will meet the minimum requirements to be eligible to enter the university, regardless of your scores on standardized tests. If your grade point average falls between 3.29 and 2.82, you will meet the minimum requirements for the university if you achieve the specified scores on the standardized tests (see the Eligibility Index opposite).

In determining the required grade point average, the university will use a semester grade of A in one course to balance a semester grade of C in another. Grades you received in courses taken in the 9th grade or earlier are not used in determining your grade point average. (However, these courses may be used to satisfy subject requirements.) The grades that appear on your official high school transcript, including those earned in accelerated and advanced courses, are the grades the university will use in evaluating your record. Grades are counted on a semester basis unless your school gives only year grades.

To meet the **Subject** and **Scholarship Requirements** you may repeat courses in which you received a grade of D or lower. The grade achieved in the repeated course will be calculated into the grade point average. There is no limit to the number of repeated courses that may be used in the "A to F" pattern, but each course may be repeated only one time.

### Eligibility Index

| "A-F"<br>GPA |    | SAT I<br>ACT <sup>1</sup> |      | SAT I<br>total <sup>2</sup> |      |
|--------------|----|---------------------------|------|-----------------------------|------|
| 2.82         | 36 | 1600                      | 3.06 | 25                          | 1150 |
| 2.83         | 36 | 1590                      | 3.07 | 24                          | 1130 |
| 2.84         | 35 | 1580                      | 3.08 | 23                          | 1110 |
| 2.85         | 35 | 1570                      | 3.09 | 23                          | 1090 |
| 2.86         | 35 | 1560                      | 3.10 | 22                          | 1070 |
| 2.87         | 34 | 1550                      | 3.11 | 22                          | 1050 |
| 2.88         | 34 | 1530                      | 3.12 | 21                          | 1030 |
| 2.89         | 33 | 1510                      | 3.13 | 21                          | 1010 |
| 2.90         | 33 | 1490                      | 3.14 | 20                          | 980  |
| 2.91         | 33 | 1470                      | 3.15 | 20                          | 960  |
| 2.92         | 32 | 1450                      | 3.16 | 19                          | 940  |
| 2.93         | 31 | 1430                      | 3.17 | 19                          | 920  |
| 2.94         | 31 | 1400                      | 3.18 | 18                          | 900  |
| 2.95         | 31 | 1370                      | 3.19 | 18                          | 870  |
| 2.96         | 30 | 1350                      | 3.20 | 17                          | 840  |
| 2.97         | 30 | 1330                      | 3.21 | 17                          | 810  |
| 2.98         | 29 | 1310                      | 3.22 | 16                          | 780  |
| 2.99         | 28 | 1290                      | 3.23 | 16                          | 750  |
| 3.00         | 28 | 1270                      | 3.24 | 15                          | 720  |
| 3.01         | 27 | 1250                      | 3.25 | 15                          | 690  |
| 3.02         | 27 | 1230                      | 3.26 | 14                          | 660  |
| 3.03         | 26 | 1210                      | 3.27 | 14                          | 630  |
| 3.04         | 26 | 1190                      | 3.28 | 13                          | 600  |
| 3.05         | 25 | 1170                      | 3.29 | 12                          | 570  |

<sup>1</sup>The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.

<sup>2</sup>The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.

### Examination Requirement

All freshman applicants must submit official scores from the College Board or the American College Testing (ACT) Program. If you are applying for admission to the fall quarter, take the tests no later than December of your senior year (earlier testing is recommended). The following tests are required:

- Scholastic Assessment Test-I (SAT-I—College Board)—The verbal and mathematics tests scores you submit must be from the same sitting,

### OR

- American College Test—the composite score is used,

### AND

- Three Scholastic Assessment Tests-II (SAT-II—College Board), which must include (a) writing test, (b) mathematics (level I or II) and (c) one test from the social studies or science or foreign language, or the test in English literature. The English Language Proficiency Test is not an acceptable option.

If you are a California resident and your grade point average in the required high school subjects is 3.30 or higher, the tests are required but your scores will not be used to determine your minimum eligibility for admission. (**Reminder: At UC Davis, students generally must perform well above the minimums in order to gain admission.**)

If your grade point average in the "A to F" requirement is less than 3.30, refer to the table above to see the examination scores you must earn to be eligible for university admission.

Make arrangements to take the required SAT-I and SAT-II by writing to College Board SAT, Princeton, NJ 08541. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not to the university.) UC Davis' College Board code is 4834 and the ACT code is 0454.

### Minimum Requirements for Residents of Other States

If you are a freshman applicant who does not claim California residency, you must meet the following requirements for minimum admission eligibility to the University of California (**Students generally must perform well above the minimum in order to gain admission to UC Davis**):

- Graduate from a regionally accredited or state-accredited high school
- Satisfactorily complete the subject requirements listed under Requirements for California Residents
- Earn a grade point average of at least 3.40 (B+) in the courses used to meet the subject requirements
- Complete the examination requirements listed for California residents

### Minimum Eligibility by Examination Alone

If you do not meet the minimum scholarship and subject requirements for admission, you can meet minimum requirements for eligibility as a freshman by examination alone. The examinations must be taken before you graduate from high school. (If you have completed transferable college courses, College Board subject tests cannot be taken in academic subjects covered in those courses.) You must take the same College Board tests discussed above and receive a total score of at least 1400 on the SAT-I, or a score of 31 on the American College Test. Your total score on the SAT-II must be 1760 or higher with no score less than 530 on an individual test. If you are a nonresident applicant, your score on the SAT-II must be 1850 or higher with no score less than 530 on an individual test.

### High School Proficiency Examination

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).

### Transfer Credit

Transfer credit may be granted to a freshman applicant for an acceptable college course taken while still in high school if an official transcript is received from the college that conducted the course.

Transfer credit is also granted for each College Board Advanced Placement Examination completed with a score of 3, 4 or 5. International Baccalaureate Higher Level Examinations with scores of 5, 6 or 7 will receive transfer credit. If students take college courses in combination with Advanced Placement or International Baccalaureate Examinations in the same subject areas, transfer credit may be limited due to duplication of credit.

### Advanced Placement Examinations

If you take one or more of the College Board Advanced Placement (AP) Examinations 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.

Consult the chart on the facing page to learn how many units you will receive for an AP Examination (see the column headed: Credit Toward Degree). How those units will be applied toward specific degree requirements in each college is explained for each exam category and in the notes below each exam listing. 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 in the "Undergraduate Education" chapter.)

In general, you may not earn university credit for 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 department or dean's office 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 college or university or in college-level extension classes since last attendance at 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 your college record and apply for admission as a freshman.

California residents must meet the requirements that follow. If you are not a California resident, see Requirements for Residents of Other States below. **At UC Davis, students generally must perform well above the minimums in order to gain admission**, since the number of eligible applicants exceeds the number of students we can admit.

The highest priority for admission is given to California Community College transfer applicants with 60 semester or 90 quarter units of transfer work with the highest academic achievement, as well as, in some areas, the completion of lower division major program.

### UC Minimum Requirements for California Residents

Transfer applicants must meet one of the following conditions:

- Students who were eligible for admission to the university when they graduated from high school—meaning they satisfied the Subject, Scholarship and Examination Requirements—are UC minimally eligible to transfer if they have a C (2.00) in their transferable college course work.

## College Board Advanced Placement (AP) Examination Credit

| Examination                                                                                                                                                                                                                                        | Score   | UC Davis Course Equivalencies       | Continuing Course                                                          | Credit Toward Degree |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------|----------------------------------------------------------------------------|----------------------|
| <b>ENGLISH</b>                                                                                                                                                                                                                                     |         |                                     |                                                                            |                      |
| A score of 3, 4, or 5 on the English AP examination satisfies the university Subject A requirement.                                                                                                                                                |         |                                     |                                                                            |                      |
| English                                                                                                                                                                                                                                            | 5, 4    | English 1, 3                        |                                                                            | 8 units              |
| College of Agricultural and Environmental Sciences: 4 units—Satisfies first part of English composition requirement.                                                                                                                               |         |                                     |                                                                            |                      |
| College of Engineering: 8 units—Satisfies English 1; 4 units of credit allowed toward Humanities/Social Sciences electives.                                                                                                                        |         |                                     |                                                                            |                      |
| College of Letters and Science: Satisfies first course toward English Composition requirement.                                                                                                                                                     |         |                                     |                                                                            |                      |
| English                                                                                                                                                                                                                                            | 3       |                                     |                                                                            | 8 units              |
| <b>FOREIGN LANGUAGES</b>                                                                                                                                                                                                                           |         |                                     |                                                                            |                      |
| College of Agricultural and Environmental Sciences: 4 units of credit allowed toward Breadth requirement or Unrestricted electives for each foreign language examination passed.                                                                   |         |                                     |                                                                            |                      |
| College of Letters and Science: Examinations (except for Latin) satisfy the Foreign Language requirement.                                                                                                                                          |         |                                     |                                                                            |                      |
| College of Engineering: 4 units of credit allowed toward Humanities/Social Science electives for each foreign language examination passed.                                                                                                         |         |                                     |                                                                            |                      |
| French                                                                                                                                                                                                                                             | 5       | French 22                           | French 23, or consultation with adviser                                    | 8 units              |
| French                                                                                                                                                                                                                                             | 4       | French 21                           | French 22                                                                  | 8 units              |
| French                                                                                                                                                                                                                                             | 3       | French 3                            | French 3                                                                   | 8 units              |
| German                                                                                                                                                                                                                                             | 5, 4    | German 20                           | German 21, upper division literature courses                               | 8 units              |
| German                                                                                                                                                                                                                                             | 3       | German 3                            | German 20                                                                  | 8 units              |
| Latin (Vergil)                                                                                                                                                                                                                                     | 5, 4, 3 | Latin 2                             | Determined by consultation with Classics adviser                           | 4 units              |
| Latin (Lyric)                                                                                                                                                                                                                                      | 5, 4, 3 | Latin 2                             | Determined by consultation with Classics adviser                           | 4 units              |
| Spanish                                                                                                                                                                                                                                            | 5, 4    | Spanish 21                          | Spanish 22, 23 or 24, or more advanced course in consultation with adviser | 8 units              |
| Spanish                                                                                                                                                                                                                                            | 3       | Spanish 3                           | Spanish 21, or consultation with adviser                                   | 8 units              |
| <b>HUMANITIES</b>                                                                                                                                                                                                                                  |         |                                     |                                                                            |                      |
| College of Agricultural and Environmental Sciences: 8 units of credit allowed toward Breadth requirement or Unrestricted electives for each humanities examination passed.                                                                         |         |                                     |                                                                            |                      |
| College of Engineering: 8 units of credit allowed toward Humanities/Social Science electives for each humanities examination passed.                                                                                                               |         |                                     |                                                                            |                      |
| Art Studio                                                                                                                                                                                                                                         | 5       | Art Studio 2, 5                     |                                                                            | 8 units              |
| College of Letters and Science: partially satisfies Area (breadth) requirements for A.B. degree.                                                                                                                                                   |         |                                     |                                                                            |                      |
| Art Studio                                                                                                                                                                                                                                         | 4       | Art Studio 2                        |                                                                            | 8 units              |
| College of Letters and Science: partially satisfies Area (breadth) requirements for A.B. degree.                                                                                                                                                   |         |                                     |                                                                            |                      |
| Art Studio                                                                                                                                                                                                                                         | 3       |                                     |                                                                            | 8 units              |
| Art History                                                                                                                                                                                                                                        | 5       | Art History 1A, 1B, 1C              |                                                                            | 8 units              |
| College of Letters and Science: partially satisfies Area (breadth) requirements for A.B. degree.                                                                                                                                                   |         |                                     |                                                                            |                      |
| Art History                                                                                                                                                                                                                                        | 4, 3    |                                     |                                                                            | 8 units              |
| American History                                                                                                                                                                                                                                   | 5, 4, 3 | History 17A, 17B                    |                                                                            | 8 units              |
| Satisfies the university American History and Institutions requirement. History 17A and 17B may be taken for full credit.                                                                                                                          |         |                                     |                                                                            |                      |
| European History                                                                                                                                                                                                                                   | 5, 4, 3 | History 4B, 4C                      |                                                                            | 8 units              |
| All colleges: History 4A and 4B may be taken for full credit.                                                                                                                                                                                      |         |                                     |                                                                            |                      |
| Music                                                                                                                                                                                                                                              | 5, 4, 3 | Music 10                            |                                                                            | 8 units              |
| College of Letters and Science: partially satisfies Area (breadth) requirements for A.B. degree.                                                                                                                                                   |         |                                     |                                                                            |                      |
| <b>NATURAL SCIENCES</b>                                                                                                                                                                                                                            |         |                                     |                                                                            |                      |
| All colleges: 4 units of credit toward Natural Sciences Credit or Preparatory Course Work allowed for science majors for each Natural Sciences examination passed, except 8 units of credit allowed for Mathematics BC and Physics B examinations. |         |                                     |                                                                            |                      |
| Biology                                                                                                                                                                                                                                            | 5, 4, 3 | Biological Sciences 10              |                                                                            | 8 units              |
| Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.                                                                                                                                       |         |                                     |                                                                            |                      |
| Chemistry                                                                                                                                                                                                                                          | 5       | Chemistry 2A                        | Determined by consultation with adviser                                    | 8 units              |
| Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2HA, 2HB, 2HC sequence.                                                                                                                      |         |                                     |                                                                            |                      |
| Chemistry                                                                                                                                                                                                                                          | 4, 3    | Chemistry 10                        |                                                                            | 8 units              |
| Computer Science AB                                                                                                                                                                                                                                | 5, 4    | Computer Science Engineering 30     | Computer Science Engineering 40                                            | 4 units              |
| Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor                                                                                                                |         |                                     |                                                                            |                      |
| Computer Science AB                                                                                                                                                                                                                                | 3       |                                     |                                                                            | 4 units              |
| College of Engineering: examination awards units towards the unrestricted electives requirement.                                                                                                                                                   |         |                                     |                                                                            |                      |
| Computer Science A                                                                                                                                                                                                                                 | 5, 4, 3 |                                     | Computer Science Engineering 30                                            | 2 units              |
| Mathematics AB                                                                                                                                                                                                                                     | 5, 4    | Mathematics 12, 16A, or 21A         | Mathematics 16B or 21B                                                     | 4 units              |
| Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.                                                                                           |         |                                     |                                                                            |                      |
| Mathematics AB                                                                                                                                                                                                                                     | 3       |                                     | Mathematics 16A or 21A                                                     | 4 units              |
| Mathematics BC                                                                                                                                                                                                                                     | 5       | Mathematics 12, 16A-16B, or 21A-21B | Mathematics 16C or 21C                                                     |                      |
| Mathematics 16A, 16B, 21A, or 21B may be taken for full credit. Mathematics 16A, 16B, 21A, or 21B equivalents may serve as a prerequisite for Mathematics 16B, 16C, 21B, or 21C.                                                                   |         |                                     |                                                                            |                      |
| Mathematics BC                                                                                                                                                                                                                                     | 4, 3    | Mathematics 12, 16A, or 21A         | Mathematics 16B or 21B                                                     |                      |
| Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.                                                                                           |         |                                     |                                                                            |                      |
| Physics B                                                                                                                                                                                                                                          | 5       | Physics 1A, 1B, 7A, 7B, 7C, 10      | Determined by consultation with adviser                                    | 8 units              |
| Physics 7A, 7B, 7C may be taken for full credit.                                                                                                                                                                                                   |         |                                     |                                                                            |                      |
| Physics B                                                                                                                                                                                                                                          | 4, 3    | Physics 10                          |                                                                            | 8 units              |
| Physics CI                                                                                                                                                                                                                                         | 5       | Physics 1A, 7B, or 9A               |                                                                            | 4 units              |
| College of Engineering: only a score of 5 on Physics CI and CII Examinations applies toward Physics requirement.                                                                                                                                   |         |                                     |                                                                            |                      |
| Physics CI                                                                                                                                                                                                                                         | 4       | Physics 1A or 7B                    |                                                                            | 4 units              |
| Physics CI                                                                                                                                                                                                                                         | 3       |                                     |                                                                            | 4 units              |
| Physics CII                                                                                                                                                                                                                                        | 5, 4    | Physics 1B or 7A                    |                                                                            | 4 units              |
| Physics CII                                                                                                                                                                                                                                        | 3       |                                     |                                                                            | 4 units              |
| <b>SOCIAL SCIENCE</b>                                                                                                                                                                                                                              |         |                                     |                                                                            |                      |
| College of Agricultural and Environmental Sciences: 4 units of credit allowed toward Breadth requirement or Unrestricted electives for each Social Science examination passed.                                                                     |         |                                     |                                                                            |                      |
| College of Engineering: 4 units of credit allowed toward Humanities/Social Sciences electives requirement for each Social Science examination passed.                                                                                              |         |                                     |                                                                            |                      |
| American Government and Politics                                                                                                                                                                                                                   | 5, 4, 3 | Political Science 1                 |                                                                            | 4 units              |
| Political Science 1 satisfies American History and Institutions requirement.                                                                                                                                                                       |         |                                     |                                                                            |                      |
| Comparative Government and Politics                                                                                                                                                                                                                | 5, 4, 3 | Political Science 2                 |                                                                            | 4 units              |
| Economics (Micro)                                                                                                                                                                                                                                  | 5, 4, 3 | Economics 1A                        | Determined by consultation with Economics adviser                          | 4 units              |
| Economics (Macro)                                                                                                                                                                                                                                  | 5, 4, 3 | Economics 1B                        | Determined by consultation with Economics adviser                          | 4 units              |
| Psychology                                                                                                                                                                                                                                         | 5       | Psychology 1                        |                                                                            | 4 units              |
| Psychology                                                                                                                                                                                                                                         | 4, 3    |                                     |                                                                            | 4 units              |

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*The Bodega Marine Reserve, located on the Sonoma coast, provides research opportunities for graduate and undergraduate students.*

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- Students who met the Scholarship Requirement but did not satisfy the Subject Requirement must take transferable college courses in the subjects they are missing, earn a grade of C or better in each of these required courses, and earn an overall C (2.00) average in all transferable college course work to be minimally eligible to transfer. Students who met the Scholarship Requirements but did not meet the Examination Requirement must complete a minimum of 12 semester (18 quarter) units of transferable work and earn an overall C (2.00) average in all transferable college course work completed.
- Students who were not eligible for admission to the university when they graduated from high school because they did not meet the Scholarship Requirement must:

a. complete 90 quarter units or 60 semester units of transferable college credit with a grade point average of at least 2.40,

**and**

- b. Complete a course plan requirement to include:
1. Two transferable college courses (3 semester or 4-5 quarter units each) in English composition; and,
  2. One transferable college course (3 semester or 4-5 quarter units) in mathematical concepts and quantitative reasoning; and,
  3. Four transferable college courses (3 semester or 4-5 quarter units each) chosen from at least two of the following subject areas: the arts and humanities, the social and behavioral sciences, the physical and biological sciences.

Each of the courses in this pattern must be completed with a grade of C or better.

### **Minimum Requirements for Residents of Other States**

If you meet the requirements for admission as a nonresident freshman, you must have a grade point average of 2.80 or better in college courses that are accepted for transfer credit by the University of California.

If you don't meet the minimum requirements for admission as a nonresident freshman, you must have completed at least 90 quarter units (60 semester units) of transferable work with a grade point average of 2.80 or better and have completed the subject requirements for California residents. Students generally must perform **well above the minimums** to gain admission to UC Davis.

### **Transfer Admission to the College of Engineering**

The College of Engineering, in screening applicants, gives priority to junior-level California community college students who have completed a minimum of 60 semester/90 quarter units of transfer work **and** the specified required lower division engineering courses and who have high GPAs.

The lower division programs and required courses are specified in the "Programs and Courses" section of this catalog, under the specific engineering major. You can also find this information on the World Wide Web at <http://registrar.ucdavis.edu/UCDWebCatalog>. Direct questions about courses required for transfer admission to your counselor or to the Engineering Undergraduate Office (530-752-0556).

### **Unit Credit for Courses Taken Elsewhere**

The university gives unit credit to transfer students for courses they have completed at other accredited colleges and universities. To be accepted for credit, your

courses must be comparable to those offered at the university, as determined by Undergraduate Admissions and Outreach Services.

A total of 105 quarter units (70 semester units) toward a university degree may be earned at a community (two-year) college. Only subject credit will be granted for courses taken in excess of these amounts.

### UC Intercampus Transfer

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

## ADMISSION AS AN INTERNATIONAL STUDENT

UC Davis welcomes competent, qualified applicants from around the world. An application may be obtained by writing to Undergraduate Admissions and Outreach Services, University of California, One Shields Avenue, Davis, California, 95616-8507, or students may apply via the World Wide Web at <http://www.ucop.edu/pathways>. It is very important to file the application during the appropriate filing period.

To be eligible for admission to the university, international students need to meet specific academic and financial qualifications. International students are responsible for providing the university with all secondary school and college transcripts. The Test of English as a Foreign Language (TOEFL) is a requirement of admission for applicants from abroad or for those with little schooling in the United States when English is not the applicant's native language. A minimum score of 500 is required.

The Scholastic Assessment Tests (SAT-I and SAT-II) are required for international freshman applicants who are graduates of U.S. high schools or American-type schools abroad. These tests are also required for applicants who come from countries that do not have national, external examinations at the end of secondary school. Because many preliminary admission decisions are made on the basis of test scores and marks, all international freshman applicants are strongly encouraged to take these tests and to have the official scores reported to UC Davis as early as possible.

For transfer students, course work is considered transferable if the applicant completed the course at an institution that is recognized by the University of California and is comparable to course work offered at the University of California.

Most international students are required to complete a "Financial Statement for Students Seeking Nonimmigrant Status" that attests to the student's ability to pay for nonresident tuition and fees and living expenses.

All international students who have not satisfied the Subject A requirement through domestic course work or testing, or whose native language is not English, must take the Examination in English as a Second Language upon entering UC Davis. Depending on the

results of the exam, students may be required to enroll in appropriate classes until they have achieved the necessary language skills.

## CAMPUS ADMISSION STANDARDS

The University of California makes every effort to provide a place for all California resident applicants who meet the minimum UC admission requirements and file an application during the appropriate priority filing period.

In recent years, UC Davis has received more applications than the number of spaces available. When UC Davis cannot accept all eligible applicants, it uses standards that are **more demanding than the minimum requirements** to select students. These standards, which are called selection criteria, identify those students who have demonstrated the capacity for high academic achievement and who have a variety of other qualities that can contribute to the strength and diversity of the campus community.

The selection criteria described below will be used for applicants for the fall 1999 term. The criteria may differ for the winter and spring terms because enrollment targets and applicant qualifications change. Applicants for winter or spring should contact Undergraduate Admissions and Outreach Services for more information.

### Selection Guidelines

Each campus, in consultation with the Office of the President, develops enrollment targets that specify the number of new freshman and advanced standing students expected to enroll. Campuses that receive more applications than required to meet their enrollment target admit students using the criteria described below.

### Freshman Applicants

**Academic Criteria** (*used to select up to 60 percent of admits*): UC Davis selects freshman applicants who have made the greatest effort to fully prepare academically as measured by the following criteria:

1. Calculated GPA on all academic courses completed in the "A to F" subject areas, with additional points given for honors courses. Maximum value is 4.00.
2. College entrance test scores—SAT-I or ACT **and** the three SAT-II test scores.
3. The number and content of college preparatory courses taken in academic subjects beyond UC minimums.
4. The number of university-approved honors or advanced placement courses completed or in progress.

**Supplemental Criteria** (*used to select up to 40 percent of admits*): Applicants are evaluated using the selection cri-





teria described above in conjunction with the following supplemental criteria:

1. Personal accomplishments, talents, school and community experiences or interests that will contribute to the educational environment of the campus.
2. Special circumstances that may have affected the applicant's life, including personal hardship and economic and educational disadvantage.

### Transfer Applicants

**Academic Criteria:** Top priority for admission consideration is given to UC-eligible California community college junior level transfer applicants with 60 semester/90 quarter units of transfer work. Other UC-eligible transfer applicants will be admitted if space is available.

When applications far exceed the number of spaces available—for majors such as engineering, biological sciences, computer science, exercise science, international relations and psychology, for example—the completion of specific lower division preparatory courses for the major is required. Contact Undergraduate Admissions and Outreach Services for information on which majors are so impacted.

**Supplemental Criteria:** The same supplemental criteria described above for freshmen are used.

### Notification and Acceptance of Admission

Upon completion of a review of your academic records, you will be notified of your admission status by letter.

The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for fall quarter will be notified of their admission status between March 1 and mid-March for freshmen, and March 1 and May 1 for transfer applicants. When you receive your notification of admission you will also receive an important form called the **Statement of Intent to Register (SIR)**. Complete the form and return it to the Cashier's office, along with the required *nonrefundable* \$100 deposit, in order to complete the admissions process. This advance deposit is applied to your university registration fee as long as you register in the quarter to which you are admitted. EOP applicants are not required to submit the \$100 advance deposit; however, they will pay full registration fees at the time of registration.

The Statement of Intent to Register (SIR) for the fall term should be returned by May 1 (freshman) or June 1 (transfer) to notify the campus that you wish to attend. Students admitted to winter or spring quarter must return the SIR by the date specified in the notification letter of admission.

## READMISSION

If you are a former UC Davis undergraduate student planning to resume studies at the Davis campus as an undergraduate, you must file an Application for Readmission, available in the Office of the Registrar, and pay a nontransferable, nonrefundable fee of \$40. (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have

attempted in the interim must be submitted to the Office of the Registrar.

Students applying for readmission must file their applications on or before the following deadlines:

| Quarter     | Deadline Date    |
|-------------|------------------|
| Fall 1998   | July 31, 1998    |
| Winter 1999 | October 30, 1998 |
| Spring 1999 | January 29, 1999 |

## SPECIAL PROGRAMS

### Concurrent Enrollment

Concurrent courses are regular university courses open to the community on a space-available basis through University Extension. This program allows an individual to pursue academic interests and to test academic abilities at the university.

For information, write to the University Extension office, Research Park, University of California, Davis, CA 95616 (530-757-8777).

### Educational Opportunity Program (EOP)

The Educational Opportunity Program (EOP) assists students from economically, socially, and/or educationally disadvantaged backgrounds. EOP can help students with the admission application process and offers academic, social and cultural support. (See also under the "Academic Advising and Student Resources" chapter.) Application fee waivers and financial aid are available to those individuals with demonstrated financial need. Contact Undergraduate Admissions and Outreach Services for information on obtaining fee waivers, and contact the Financial Aid Office regarding financial assistance. Once enrolled, contact the EOP Information Office for a quarterly newsletter and class information.

To apply for the program, each applicant must complete the regular UC admission application form and complete the appropriate items related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required personal statement.

### Limited Status

Students in limited status are those whose special attainments qualify them to take certain courses in the university toward a definite and limited objective. To apply for limited status admission, you must either have a bachelor's degree but not be a candidate for an advanced degree, or have completed a substantial amount of college work with a satisfactory grade point average. You must submit an undergraduate application with fee as well as a limited status petition and official transcripts from all schools attended. As a limited status student you will be expected to maintain a certain scholarship average during a predetermined time of enrollment.

Application filing dates are the same as those for new undergraduate applicants. Fees for limited status students are the same as those for new applicants. You will not be admitted to limited status for the purpose of raising a low scholarship average.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the undergraduate admissions director and the dean of the college.

Enrollment pressures have necessitated closing this category of admission for the College of Engineering and the College of Letters and Science.

### Second Baccalaureate

If you have a bachelor's degree substantially equivalent to one that is granted by the University of California, you **may** be allowed to enroll as an undergraduate seeking a second bachelor's degree. Admission in this category will depend upon a superior academic record and clear evidence of a change in objective.

Admission to the Colleges of Agricultural and Environmental Sciences and Engineering requires the approval of the undergraduate admissions director and the dean of the college. You must submit an undergraduate application, a second baccalaureate petition (except College of Engineering) as well as official transcripts from all schools attended. Application filing dates are the same as those for new undergraduate applicants.

*The College of Engineering will accept applicants if their first degree is **not** in engineering **and** if they complete the lower division engineering program at a California community college. Enrollment pressures have necessitated closing this category of admission for the College of Letters and Science.*

### Special Status

The special status classification is for applicants 21 years of age or older who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work, but by reason of special attainment or background may be prepared to undertake certain courses at UC Davis toward a definite and limited objective.

You will not be admitted to special status for the purpose of fulfilling requirements for admission as a regular student. Conditions for admission are determined by the admissions director and are subject to approval by the dean of Agricultural and Environmental Sciences. Admission is for a specified time only and a prescribed scholastic average must be maintained. Application, special status petition, fees and filing dates are the same as those for new applicants.

*Enrollment pressures have necessitated closing this category of admission for the College of Engineering and the College of Letters and Science.*

## ADMISSION CHECKLIST

- 1.** Apply via the World Wide Web at <http://www.ucop.edu/pathways>. You can also obtain the *Application for Undergraduate Admissions and Scholarship* from your local high school, community college, or a campus of the University of California. If you are not a California resident and cannot apply via the web, request an application from Undergraduate Admissions and Outreach Services, 178 Mrak Hall, University of California, One Shields Avenue, Davis, CA 95616-8507.
- 2.** Complete the application, including the essay, and list the college and major you prefer. Attach a check or money order to cover the application fee with your application materials, and return them in the preaddressed envelope **during the priority filing period for the quarter in which you are interested**; do not attach any other documents.
- 3.** **Keep a copy of your application and essay.**
- 4.** Keep the notices you receive from both the Undergraduate Application Processing Service and the Undergraduate Admissions offices.
- 5.** If you are applying from high school, *do not send* a preliminary transcript unless asked to do so by Undergraduate Admissions and Outreach Services. Please arrange to have official test scores forwarded by the testing agency. If you are applying as a transfer student, arrange to have **all** official transcripts sent to each UC campus to which you applied.
- 6.** High school applicants for the fall quarter should take the SAT-I or ACT **and** the **three** SAT-II tests **no later than December**. We strongly encourage you to complete these tests by the November test date.
- 7.** Undergraduate Admissions and Outreach Services may request additional information, such as official transcripts, or confirmation of work in progress. Send this information right away so your application can be evaluated without delay.  
**Your eligibility for admission cannot be evaluated until all your application materials are received**; i.e., application form, filing fee, essay, official transcripts (if required), work in progress, and test scores (if required).
- 8.** If you are admitted, keep your admission letter for your records.
- 9.** Return your “**Statement of Intent to Register**” (SIR), “Statement of Legal Residence,” Student Address form, and the nonrefundable advance deposit of \$100 (if required) no later than the date stated on the SIR, so you can be authorized to complete registration.
- 10.** After your SIR is received, you will be sent information from the Cowell Student Health Center. Return your completed Medical History and Immunization forms to the Cowell Student Health Center as soon as possible.



**FEES, EXPENSES  
AND FINANCIAL AID**

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**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.

For details concerning fees and deposits, consult the publication *1998-99 Student Fees and Deposits*, available from the Office of the Registrar. Current fees are also published in the current *Class Schedule and Room Directory*, and on the World Wide Web at: [http://www.pbo.ucdavis.edu/student fees/](http://www.pbo.ucdavis.edu/student%20fees/)

At the time of registration each quarter, every student must pay the quarterly fees as shown in the box at right. (A Registration Fee Deferred Payment Plan, which allows students to pay quarterly fees in three 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 of art supplies for an art studio class. They might also cover film rentals, field trips, or the purchase or rental of specific equipment. The campus is currently reviewing the application and extent of such fees.

**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. Undergraduates file their part-time petition with the Office of the Registrar, 12 Mrak Hall. Graduate students file their petition with Graduate Studies, 250 Mrak Hall.

**UC Employee-Student Fees**

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the university. Once admitted, the employee-student must file a petition for the reduction in fees before each quarter of enrollment. Employee-students pay one-third of the full-time Registration Fee, one-third of the full-time Education Fee. Employee-students also pay the Memorial Union Fee and the Student Facilities Safety Fee. Please refer to the quarterly *Class Schedule and Room Directory* for fee information.

Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is

**Undergraduate Student Fees**

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

|                                       | Fall<br>Quarter   | Annually           |
|---------------------------------------|-------------------|--------------------|
| <b>California Residents</b>           |                   |                    |
| University Registration Fee .....     | \$238.00          | 713.00             |
| Educational Fee .....                 | \$966.00          | \$2,896.00         |
| Associated Students                   |                   |                    |
| (ASUCD) Fee .....                     | \$23.50           | \$70.50            |
| Memorial Union Fee .....              | \$28.50           | \$85.50            |
| Undergraduate Health Insurance        |                   |                    |
| Fee (optional)* .....                 | —                 | —                  |
| Student Health Services Fee .....     | \$32.00           | \$96.00            |
| Student Services Maintenance          |                   |                    |
| Fee and Student Activities            |                   |                    |
| and Services Initiative Fee .....     | \$76.00           | \$226.00           |
| Student Facilities Safety Fee .....   | \$22.00           | \$66.00            |
| <b>Total for full-time</b>            |                   |                    |
| <b>California residents .....</b>     | <b>\$1,386.00</b> | <b>\$4,153.00</b>  |
| Total for <b>part-time</b> California |                   |                    |
| residents .....                       | \$903.00          | \$2,705.00         |
| <b>Nonresidents</b>                   |                   |                    |
| University Registration Fee .....     | \$238.00          | 713.00             |
| Educational Fee .....                 | \$1,029.00        | \$3,086.00         |
| Associated Students                   |                   |                    |
| (ASUCD) Fee .....                     | \$23.50           | \$70.50            |
| Memorial Union Fee .....              | \$28.50           | \$85.50            |
| Undergraduate Health Insurance        |                   |                    |
| Fee (optional)* .....                 | —                 | —                  |
| Student Health Services Fee .....     | \$32.00           | \$96.00            |
| Student Services Maintenance          |                   |                    |
| Fee and Student Activities            |                   |                    |
| and Services Initiative Fee .....     | \$76.00           | \$226.00           |
| Student Facilities Safety Fee .....   | \$22.00           | \$66.00            |
| Tuition for nonresidents .....        | \$3,128.00        | \$9,384.00         |
| <b>Total for full-time</b>            |                   |                    |
| <b>nonresidents .....</b>             | <b>\$4,577.00</b> | <b>\$13,727.00</b> |
| Total for <b>part-time</b>            |                   |                    |
| nonresidents .....                    | \$2,498.50        | \$7,492.00         |

\* Undergraduates may elect to purchase university-sponsored health insurance at registration. The fee for the 1998-99 academic year is approximately \$138.00 per quarter. Foreign undergraduate students and students in the Family Nurse Practitioner and Physician Assistant Programs must participate in the Graduate Student Health Insurance Plan (GSHIP) and pay a Graduate Student Health Insurance Plan Fee of approximately \$133.50 per quarter.

greater. Information is in the Personnel Policies For Staff Members Manual (section 51) available in department offices, at Shields Library, the Staff Development and Professional Services Office, and on the World Wide Web. Petitions can be obtained through the employee's unit.



**Graduate and Professional Student Fees**

Graduate and professional student fees are listed in the relevant chapters of this catalog.

**Motor Vehicle Parking Permit and Bicycle Licensing Fees**

Parking permit rates are available at Parking Services or you may call (530) 752-8277.

A California State License fee is required for all bicycles on campus (initial license, \$6; renewals, \$3).

**Costs for a Year at UC Davis**

The costs listed below are average costs, and your own living expenses may differ somewhat from these. More information on living expenses can be found in the section on housing or from the Financial Aid Office.

| <b>Average Student Costs Annually</b>            |                    |
|--------------------------------------------------|--------------------|
| <b>Undergraduate</b>                             |                    |
| Fees .....                                       | \$4,157            |
| Books and supplies .....                         | \$820              |
| Housing and Food .....                           | \$5,161            |
| Personal expenses .....                          | \$1,978            |
| Transportation.....                              | \$673              |
| <b>Total (off-campus residence) .....</b>        | <b>\$12,799</b>    |
| <b>Total (on-campus residence) .....</b>         | <b>\$13,916</b>    |
| <b>Graduate (single; living off campus).....</b> |                    |
| Graduate School of Management .....              | \$21,407           |
| School of Law                                    | \$21,651 to 21,460 |
| (depending upon the year in school)              |                    |
| School of Medicine                               | \$22,238 to 23,988 |
| (depending upon the year in school)              |                    |
| School of Veterinary Medicine                    | \$20,357 to 21,569 |
| (depending upon the year in school)              |                    |

**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 1998-99 academic year, we estimate the cost will be \$25,000. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, \$25,000 is only a preliminary figure. This minimum allowance may be increased without advance notice.

During the admission process, most international undergraduate students are required to complete the Financial Statement for Students Seeking Nonimmigrant Status 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 bring a minimum of \$4,000 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 Notice of Cancellation/Withdrawal form and return the form to the Office of the Registrar. If you don't submit a Notice of 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 paid fees and cancel or withdraw with official approval before the end of any quarter, fees may be refunded according to the Schedule of Refunds below.

The effective date for determining a refund of fees is the date you file a completed Notice of Cancellation/Withdrawal form with the Office of the 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 Notice of Cancellation/Withdrawal form is processed. If you enrolled, but have not paid fees in full by the tenth day of instruction, you will be dropped for non-payment and officially withdrawn from the university.

**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 (below) 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.

**Planned Educational Leave Program**

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 Registrar before or on the first day of instruction. See Planned Education Leave 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 Registrar. Percentages listed (days 1-35) should be applied respectively to University Registration Fee, Educational Fee, Nonresident Tuition, and other student fees.

**University Registration Fee, Educational Fee, Nonresident Tuition and other student fees:**

| <b>Calendar Days Elapsed</b> | <b>Percentage of Fees Refunded</b> |
|------------------------------|------------------------------------|
| 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.

**Refund of Health Insurance Fee**

If you paid the health insurance fee and you are cancelling your registration on or before the first day of instruction, you are entitled to a 100 percent refund of this fee. **Undergraduates** must contact the Health Insurance Office at 530-752-2612 to receive the refund. **Graduates** will get an automatic refund from the Accounting Office.

After the first day of instruction, no refund of the health insurance fee will be issued. Any questions regarding the refund of health fees for withdrawals should be directed to the Student Health Center.

**FINANCIAL AID**

Information:  
Financial Aid Office  
227 Voorhies Hall  
530-752-2390; 530-754-6073 (TTY);  
undergradfinaid@ucdavis.edu; http://faoman.ucdavis.edu

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants and work-study employment. Financing an education is a responsibility that is shared by the student, the parents of dependent students and the Financial Aid Office (through distribution of federal, state and university funds). All students are expected to work to help finance their education.

**Financial Aid Deadlines**

Priority filing period for grants, loans, work-study and California Student Aid Commission applications for 1999-2000 Jan. 1–Mar. 2

Deadline to file for fellowships and graduate scholarships for 1999-2000 with Graduate Studies Jan. 15

Students who miss the March 2 deadline should still apply for financial aid. Even though Cal Grant, scholarship, and work-study funds may be depleted, eligible applicants can receive Pell Grants and Federal Direct Stafford/Ford Student Loans to help meet their need. The Free Application for Federal Student Aid (FAFSA) is available at local high schools, community colleges and the Financial Aid Office. Continuing UC Davis students and prospective graduate students should obtain the FAFSA from the Financial Aid Office in December.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. See “Scholarships and Awards” at the end of this chapter for information about scholarship applications.

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through Graduate Studies. State graduate fellowships are awarded to students who are pursuing an advanced or professional degree with intent to become college or university faculty members. Applicants must demonstrate financial need and academic eligibility. The awards pay part of the cost of registration fees and are based on undergraduate grades, test scores, parents’ educational level and consideration of disadvantaged background and parents’ financial information.

Eligibility for most assistance is based upon demonstrated financial need. (However, most scholarships are not based on need.) Eligibility is determined by the following formula: (1) the student is assigned a standard budget reflecting the average costs for a student attending UC Davis; (2) the student’s resources are analyzed according to federal and state regulations; (3) the resources and an expected student contribution from work are subtracted from the budget; the remainder is the amount of eligibility. The Financial Aid Office attempts to fill this amount with a combination of grants, work-study, and loans.

The awards for married students are based on the same basic budget plus the addition of a standard child care allowance, unless documentation is provided about a spouse who is unable to work, in which case a dependent living allowance will also be awarded. Single parents’ awards are based on the single student’s budget and a child care allowance. If single parents’ resources (earnings and benefits) are not sufficient to meet the basic living expenses of their dependents, a standard dependent living allowance may be awarded upon receipt of documentation. The Financial Aid Office can assist student parents who qualify for financial aid with allowances for direct child care costs.

**Satisfactory Academic Progress.** Federal regulations require that 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 the Financial Aid Office. 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 following the instructions in the financial aid application packet. Recipients must be enrolled at least half time 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. All applicants are notified via a "Student Aid Report" (SAR). The amount you receive depends on your financial need.

**Cal Grants** are awarded by the California Student Aid Commission and may be renewed each year. All undergraduate financial aid applicants who are California residents are required to apply for one of these awards. Follow the instructions in the financial aid application packet.

*Cal Grant A* awards are based on financial need and academic achievement. Recipients must complete at least 36 units per academic year. Cal Grant A pays partial registration fees.

*Cal Grant B* awards are based on financial need and are for entering 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.

**University Grants** are available to both graduate and undergraduate students. The University determines grant eligibility for undergraduates by subtracting a stu-

dent 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. Graduate students are awarded UC Grant funds based on need determined by the federal processor.

**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. Write to the agency that administers your tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid officer on campus can help you 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. Repayment of these loans (with the exception of Federal Direct PLUS loans) begins after you graduate or withdraw 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.

**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 six to 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, non-profit 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.

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*Students in the Residence Halls have access to ResNet, a data network that gives them a direct connection to the Internet.*

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- \$3,000 undergraduate annual loan limit
- \$15,000 undergraduate maximum loan limit
- \$30,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)

**Health Profession Student Loans (HPSL)** are awarded to students in the Schools of Medicine and Veterinary Medicine who demonstrate exceptional financial need. Parental income information is required for all applicants regardless of age and dependency status. HPSL borrowers must commit themselves to complete a primary care residency program, and practice in a primary care field until their HPSLs are repaid.

- \$2,500 plus fees maximum for veterinary medicine and first-year medical students
- \$3,333 plus fees maximum for medical students in the second, third or fourth year of study
- 5 percent 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. Students are advised to speak with a Financial Aid officer before borrowing an unsubsidized loan.

- Undergraduate students may borrow up to annual maximums of \$2,625 for freshmen, \$3,500 for sophomores, and \$5,500 for juniors and seniors, up to a maximum aggregate indebtedness of \$23,000.
- Independent undergraduate students may borrow unsubsidized Direct Loans up to annual maximums of \$4,000 for freshmen and sophomores, and \$5,000 for juniors and seniors.
- Graduate and professional students may borrow up to \$8,500 per year, not to exceed a maximum aggregate of \$65,500 for combined undergraduate and graduate borrowing.
- Graduate and professional students may borrow unsubsidized Direct Loans up to an annual maximum of \$10,000.
- Variable interest rate is adjusted annually, capped at 8.25 percent.
- Repayment begins six months after graduation or withdrawal.

**Federal Direct Parent Loans for Undergraduate 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.
- The maximum interest rate is 9%. There is no interest subsidy for this loan.
- Repayment begins within 60 days after loan disbursement.

**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: \$200 maximum. The maximum repayment period is 30 days.
- Short-Term Loans: \$300 maximum. 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, 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.

For information about how to apply, applications are available in the display rack on the first floor of Voorhies Hall. Application procedures vary slightly during the registration cycle of each quarter. Check the Short-Term Loan bulletin board outside 116 Voorhies Hall for instructions.

#### **Work-Study**

Information:  
Student Employment Center  
16 South Hall  
530-752-0520; sec@ucdavis.edu; <http://jobs.ucdavis.edu>

College work-study programs enable students to earn part of their financial aid through part-time employment. To participate, you must first receive work-study as a part of your financial aid package. Your work-study award offers you both money for your education and work experience. You should obtain a work-study job or ask to defer your work-study before October 31 or your award will be canceled. The Student Employment Center coordinates all undergraduate college work-study programs.

Work-study funds for graduate students are allocated directly to the chairpersons of the graduate programs or departments. Graduate students seeking work-study funding should contact their respective departments for further information.

**Federal College Work-Study Program** is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. Many community service work-study jobs are available that can provide you with an educational and rewarding work experience. To be eligible, you must be a citizen or permanent resident of the U.S., carry at least a half-time academic course load, and maintain minimum academic progress.

**California State Work-Study** is funded by the state, and employment may be with profit or nonprofit organizations. The employment must be educationally beneficial or related to a particular career interest or the exploration of a career option. To be eligible, students must meet the requirements for federal student aid eligibility and be California residents.

**University Work-Study** is funded by the University of California, and employment is limited to jobs on campus.

## UNDERGRADUATE SCHOLARSHIPS AND AWARDS

Information:  
Scholarship Office  
228 Voorhies Hall  
530-752-2804; ugscholofc@ucdavis.edu;  
<http://faoman.ucdavis.edu/schol.htm>

Mailing address:  
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 200 different undergraduate scholarships. Many more scholarships are handled through outside agencies.

Scholarship recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade point average of 3.25 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 re-apply each year for scholarship aid.

Students applying to the university for the fall quarter are considered for scholarships using the same forms completed for admission purposes. Winter and spring quarter admission applicants should contact the Scholarship Office for instructions no later than November 1. Continuing students should obtain scholarship applications from the Scholarship Office in October. These applications are due in early December. Announcement of winners is usually made 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 (a \$1,000 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs. These scholarships are renewable as long as you maintain a 3.25 grade point average.

- Dollar amounts vary—up to full financial need
- 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 maximum
- 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, 125 Hickey Gymnasium, 530-752-0543.

- 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 web site.

- Generally \$100 to \$3,200

**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**

Information:  
 Student Housing Office  
 530-752-2033; housing@ucdavis.edu;  
<http://www.housing.ucdavis.edu>

Living on campus adds a measure of convenience to your life and helps familiarize you with the campus. Some 3,600 undergraduate and graduate students live on campus each year, including about 90 percent of freshman students and 25 percent of transfer 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, desk and chair, bookcase, chest of drawers, study lamp and bulletin board for each resident. Cost depends on which of the eight meal plans you choose. The total room-and-board rate for the 1998-99 academic year is \$5,800–\$6,585 for a double-occupancy room and \$6,415–\$7,200 for a single room (of which there are very few available to new residents). Rates shown 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. Graduate students are offered contracts on a space-available basis in Lysle Leach Hall.

If the Davis campus is your choice, the Student Housing Office mails housing information with your admissions letter. If you have a physical disability that requires special housing accommodation, please send a detailed letter of explanation to the Housing Residential Services Office, Room 160, Student Housing Office, at the time you return your Statement of Intent to Register. Your housing contract will be mailed to you between May 15 and July 15. At that time you will be able to choose your meal plan.

**Student Family Housing**

Information:  
 Orchard Park/Solano Park Apartments  
 530-752-2033

Orchard Park and Solano Park Apartments offer 476 university-operated, furnished and unfurnished on-campus apartments for UC Davis student families. The monthly rates for the 1998-99 academic year will be as follows:

- Orchard Park
  - two-bedroom unfurnished apartment, \$526
  - two-bedroom furnished apartment, \$559
- Solano Park
  - one-bedroom unfurnished apartment, \$427
  - two-bedroom unfurnished apartment, \$485

Rates shown have not yet been formally approved. Once approved, they will be effective Aug. 1, 1998. 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 and before you are married, but you must show documentation of your student or parental status before occupancy can be granted.) 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.

Cooperative playgroups are sponsored by the student family housing parents' associations of Orchard and Solano Parks (530-759-0146). Each program may serve up to 15 children aged 2 to 5 years.

**Russell Park**

Information:  
 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.







### Graduate Student Apartment Housing

Information:  
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 5- or 6-person suites. Townhouses, duplexes and houses throughout the city are also available for student rental.

### Transportation and Parking

Information:  
Transportation and Parking Services (TAPS)  
Extension Center Drive  
530-752-8277  
Motorist Assistance Program: 530-752-3729  
Bicycle Program: 530-752-BIKE

The central campus is closed to motor vehicles. Walking and bicycling are the usual ways to traverse the campus, though some students prefer roller blades.

**Bicycles.** All bicycles ridden or parked on campus must have a current California State Bicycle License. You may get a license or renewal tag at TAPS. Bicycle riding and parking regulations are strictly enforced. Be sure to lock your bicycle to the provided racks and pods—bike theft is common in Davis. The **Bike Barn** offers repairs and rentals, and sells bicycle parts and accessories. Students can also check out tools to do their own repairs or maintenance.

**Buses.** Unitrans, 13 bus lines operated by the Associated Students, serves the campus and city year round. Unitrans is free to undergraduate students with a valid registration card; others may ride by paying the single ride fare or by purchasing passes from TAPS or at the Campus Box Office. Full service is provided each UC Davis school day (Monday through Friday) and Monday through Thursday night during the regular school year—fall, winter and spring quarters. Reduced schedule bus service operates during the summer, finals week, all academic break periods and on Saturdays. Schedules are available at the MU Campus Information Center, bus terminals, Davis City Hall and the Unitrans office.

**Parking.** If you park a vehicle (including a motorcycle or moped) on campus, you must have a valid parking permit or pay at a meter. You may buy a daily permit at dispensers in any Visitor/Public parking lot. All other lots require long-term permits, which you may purchase at Parking Services. UC Davis encourages ridesharing. Registered carpools and vanpools receive reduced park-

ing rates and preferential parking. Parking lots on campus are financed solely by fees collected from parking permits and meters. For information on transportation alternatives, public transit, or commuter match assistance, call 752-MILE or visit TAPS.

**Shuttles.** The UCD/UCDMC Shuttle provides hourly service Monday through Friday between the Davis campus and the medical center in Sacramento. The shuttle is available to all members of the UC Davis community.

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

### Student Employment

Information:  
Student Employment Center  
16 Basement, South Hall  
530-752-0520; <http://jobs.ucdavis.edu>

The Student Employment Center advertises student employment opportunities both on and off campus. Full-time or part-time students, students on PELP, students' spouses, and students with a letter of acceptance for the following quarter who have not yet registered are eligible.

Full-time, part-time and temporary jobs are available year-round. New listings are posted daily. Listings of employment opportunities for the summer with government agencies, camps and resorts throughout California are located at the center, as are job listings of parents wishing to hire child care providers. Registered students may access employment opportunities on-line at the World Wide Web address given above and use their student identification number as their password.

### Computing and Internet Resources

Information:  
I.T. Express  
First Floor, Shields Library  
530-754-4357; [ithelp@ucdavis.edu](mailto:ithelp@ucdavis.edu); <http://it.ucdavis.edu>

Each year, more services and information are available to registered students through e-mail, news groups and the Internet. Many departments and offices have information on the World Wide Web that students will find useful. New undergraduate students will find a personal computer very useful in their studies. Campus computing accounts are available to all registered students through the Division of Information Technology. You can activate your account at I.T. Express at the copy services desk on the first floor of Shields Library, and then use the microcomputers in computing laboratories on campus. For your personal computer, you can purchase the Bovine Online installation program at the UCD Bookstore or I.T. Express and use it to open your computer account, send e-mail and surf the Internet.

### Child Care Services

Information:  
260 Student Housing Office  
530-752-5415; [baashby@ucdavis.edu](mailto:baashby@ucdavis.edu);  
<http://www.housing.ucdavis.edu/general/child.htm>

Student Housing/Child Care Services provides child care information, referrals, and publications and serves

as the university's liaison with the on-campus day care centers and the off-campus child care services available through the City of Davis Parks and Community Services/Child Care.

### On-Campus Child Care Programs and Resources

- **LaRue Park Children's House** (753-8716; [laruepark@ucdavis.edu](mailto:laruepark@ucdavis.edu)) and **Russell Park Child Development Center** (753-2487; [jonhillis@ucdavis.edu](mailto:jonhillis@ucdavis.edu)) are privately owned and operated, serving infants through kindergarten-age children. Residents of student family housing pay reduced rates.
- The **Center for Child and Family Studies** (752-2888), a teaching and research laboratory for the Department of Human and Community Development, offers four part-time programs for children aged six months to five years. Children are selected from a waiting list according to criteria designed to meet academic goals.
- The UC Davis **Breastfeeding Support Program** provides lactation sites with electric breast pumps, registration and orientation sessions, and sales of breastfeeding supplies for mothers who wish to continue breastfeeding their infants after returning to school or work. Call 752-5415 for information.
- The Women's Resources and Research Center (752-3372) sponsors the **Child Emergency Notification Service**, which offers schools and child care providers a way to contact student parents in class if their child has a health-related emergency.
- The **Student Employment Center** (752-0520) posts listings for parents seeking license-exempt providers.

### Community Child Care Programs

Information and application:  
City of Davis Parks and Community Services/Child Care  
604 Second Street  
Davis, CA 95616  
530-757-5691;  
<http://city.davis.ca.us/city/parks/ssvcs/caremain.htm>

**City of Davis Parks and Community Services/Child Care** maintains information on licensed family child care homes, day care centers, nursery schools, playgroups and other family-related services for Yolo County. Additional services include parenting workshops and handouts; a bimonthly 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.

## COUNSELING AND HEALTH SERVICES

### Counseling Center

Information:  
219 North Hall  
530-752-0871; <http://www.counselingcenter.ucdavis.edu>

The Counseling Center offers free, confidential psychological, psychiatric and peer counseling services to all registered students having problems that affect their academic progress and sense of well-being. Staff members offer assistance with personal and interpersonal

issues such as relationships, family, stress, cultural differences, assertiveness, self esteem and intimacy. Additionally, staff can help with educational/vocational concerns such as coping with university life, academic performance, test anxiety, reentry adjustment and determining life goals. Services for relationship issues are also offered to students and their partners.

Services are free to all registered students. Confidentiality is strictly maintained in accordance with state laws and ethical standards. Walk-in services are available daily if you need immediate assistance. The center also provides short-term individual counseling, group counseling and assistance with off-campus referrals. Career interest testing, personality testing and information about graduate school admissions tests and the Planned Educational Leave Program are available.

Students, faculty or staff who are concerned about a student or desire consultation or assistance in making a referral are encouraged to call the center. To make an appointment, call or come to the Counseling Center.

### Cowell Student Health Center

Information:  
Cowell Student Health Center  
530-752-2300; <http://healthcenter.ucdavis.edu>

As an enrolled student, you are eligible to use the Health Center from the first day of the quarter through the last day of the quarter or to the date of official withdrawal. Health Center services and facilities include advice nurse; general outpatient care; regularly scheduled clinics; X-ray, laboratory and pharmacy services; physical therapy; and Women's Clinic. The Health Center does not provide routine dental or optical services.

The services of Cowell Student Health Center are made possible, in part, by the Student Health Services Fee. Co-payments are required for visits and most clinical services. Health Center services are available to students' dependents on a fee-for-service basis.

**Health Insurance.** Graduate, professional and international students must purchase a mandatory insurance plan as part of registration. Undergraduate students may purchase a voluntary plan. You may also purchase a Health Insurance Plan at the Health Center for your spouse and children. For more information, call 752-2612 or visit the Patient Accounts Office at Cowell Student Health Center.

### Health Education

Information:  
Cowell Student Health Center  
530-752-9652

Maintaining and enhancing good health is vital for the successful pursuit of your goals at UC Davis and the rest of your life. The Health Education Program provides information and services through trained peer counselors, health educators, workshops and resource libraries.

**Health Advocates** (752-9651) present small and large group workshops, health information, peer counseling and resource referrals for students dealing with personal substance abuse issues or those of friends/family members, as well as nutrition, personal dietary analysis, exercise, injury prevention, stress management and other wellness issues.

**Peer Counselors in Sexuality** (752-1151) provides peer counseling (in person or by phone) and group presentations on birth control, pregnancy, sexually transmitted diseases (including HIV/AIDS), safer sex, healthy relationships, partner communication skills, sex roles and other issues related to sexuality and reproductive health.

**Peer Counselors in Athletics** (752-6334) is an athlete-to-athlete health promotion program providing outreach presentations on alcohol, tobacco, steroids, racism, and other issues affecting student athletes.

The **Campus Alcohol and Drug Abuse Prevention Program (CADAPP)** (752-6334) organizes campuswide substance abuse prevention programs, as well as providing assessment, education and referral for students with identified needs related to alcohol and other drug abuse. CADAPP coordinates substance abuse services of both *Health Advocates* and *Peer Counselors in Athletics*.

### The House

Information:

Temporary Building 16 (two-story house by Housing Office)  
24-hour hotline: 530-752-2790; business line: 530-752-5665

The House is a professionally managed peer counseling program of the Counseling Center. 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 and support groups held in an informal setting. No appointment is necessary and services are offered on a drop-in basis from 9:00 a.m. to 11:00 p.m., seven days a week, with 24-hour telephone assistance. The House is wheelchair accessible.

Volunteers for peer counselor positions at the House are accepted each 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.

## ARTS AND RECREATION

Whatever your recreational bent—horseback riding, outdoor activities, music, arts and crafts, or sports—there's a place or program on the Davis campus for you to enjoy your favorite activities.

Social, physical, creative, intellectual and cultural activities and programs provide many healthy 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.

In addition, the City of Davis has 31 parks with various facilities, including tennis courts, playgrounds, swimming pools, playing fields, and a skateboard facility. The city has several movie theaters, art galleries, the Davis Art Center, Davis Comic Opera Company, and Davis Musical Theatre.

### Campus Recreation

Information:

Memorial Union Programs and Campus Recreation  
Memorial Union, Room 460  
530-752-1730; <http://campusrecreation.ucdavis.edu>

The following programs are available through Memorial Union Programs and Campus Recreation. A catalog of recreational activities is published quarterly, mailed to all residences in Davis and distributed throughout campus.

#### Outdoor Adventures

The Barn (on the corner of California and Hutchison)  
530-752-1995/1730

Outdoor Adventures will help you develop your outdoor skills and plan your outdoor excursions. You can rent equipment of professional quality and arrange for custom-designed trips and group rates. An up-to-date library contains topographic maps, trail guides and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, whitewater rafting, kayaking, sea kayaking, mountaineering, cross-country skiing and other sports are offered throughout the year.

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**The  
Cal Aggie  
Marching  
Band-uh  
is a  
formidable  
presence at  
all UC Davis  
home games.**

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Outdoor experts conduct many special activities, such as wilderness emergency-care clinics, whitewater river guide training, slide presentations and programs.

#### **Equestrian Center**

Garrod Dr. (southwest of Veterinary Medical Teaching Hospital)  
530-752-2372/1730

The Equestrian Center is open year round, offering trail rides, practice sessions and 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 equestrian camps and special events, and coordinates the Equestrian Club.

#### **Craft Center**

South Silo  
530-752-1475/1730

The Craft Center is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or purchase a pass for more frequent use of the equipment and work space. Workshops and classes are offered each quarter in woodworking, weaving, jewelry-making, art and graphics, computer imaging, ceramics, photography, silkscreen printing, welding, leatherworking, stained glass and other crafts.

#### **Recreation Swimming Pool**

Corner of La Rue Road and Hutchison Drive  
530-752-2695 or 530-752-1995/1730

The Rec Pool is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts and a large grass area for sunbathing. The staff offers swimming lessons to all age groups and arranges for special events, such as family nights. The pool opens for the season in April and closes in October.

#### **The Games Area**

Games Area (located below the UCD Bookstore)  
530-752-2580/1730

The Games Area features bowling lanes, billiards room, video arcade, lounge and storage lockers. The Games Area conducts bowling leagues, classes, clinics and tournaments for all ages from beginning through advanced skill levels. The facility is fully accessible to those with disabilities.

#### **The Memorial Union (MU)**

MU Campus Information Center  
530-752-2222; infocenter@ucdavis.edu

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, maintains an up-to-date database of 1,200 organizations, and takes reservations for the use of tables and display boards in and around the MU.

The complex houses the UCD Bookstore, Corral gift shop, Coffee House, MU II Conference Center, Campus Box Office (where you can purchase tickets for campus events and cash checks), Campus Events and Visitors Services (CEVS) and the MU Business Office.

King Lounge, on the second floor, provides a comfortable and relaxed atmosphere popular for studying, leisure reading and listening to music. The adjacent Music and Periodicals Center (752-2885) contains current popular periodicals and a large library of music.

**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 operates several facilities that can be rented for group gatherings. With its rustic wood-paneled interior and ceiling-high windows, **Rec Pool Lodge** is an ideal location for meetings, lectures or dances. The covered patio surrounding the lodge offers a lovely, shaded environment for outside dining during the warm weather months. **Putah Creek Lodge**, secluded in the Arboretum, provides a relaxing atmosphere for lectures, banquets, weddings or dances. The spacious lawn surrounding the lodge is suitable for volleyball and games, receptions and picnics. The lodge has kitchens and outdoor barbecues.

#### **Silo Union**

The Silo Union houses food services, meeting/conference facilities, lounges and the campus pub. In the **South Silo** are the ASUCD Experimental College (752-2568), Student Special Services (752-2007), Graduate Student Association (752-6108) and a branch of the Bookstore serving the School of Law (752-2961). To reserve space in the Silo for a meeting, social event or conference, call Campus Events and Information at 752-2813.

#### **Recreation Hall**

Information:  
Entrance 1B  
530-752-6074

Recreation Hall is a multi-use facility for intramural and informal recreation play, intercollegiate athletic basketball and women's gymnastics, physical education classes and sports clubs. Numerous special events sponsored each year by the campus and community are held in the 8,400-seat arena. The tri-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball and squash courts; two weight rooms with free weights, universals, Nautilus weight training circuit, stair machines, rowing machines, treadmills, cross-training machines and bicycles; court areas for basketball, volleyball and badminton; and areas for martial arts, table tennis, gymnastics and dance. Aerobics





classes are offered daily on a walk-in basis. A state-of-the-art artificial rockclimbing wall is available for climbers of all skill levels under the supervision of Outdoor Adventures.

Undergraduate students can use Rec Hall facilities by showing their current valid photo ID card. Graduate students pay a \$5.00 per quarter activity fee. Students may also purchase a \$6.00 guest pass valid for three people. Non-students may purchase a daily, monthly, quarterly or yearly privilege card at Rec Hall to use lockers, equipment and facilities. Prices are available at the Recreation Hall Equipment Room.

Surrounding Recreation Hall are an outdoor fitness cluster, the in-line skate facility, volleyball and basketball courts, the Community Baseball Field, soccer field, and intramural playing fields.

### **Intramural Sports/Sports Clubs and Intercollegiate Athletics**

Information:

IM Sports/Sports Clubs  
140 Recreation Hall  
530-752-3500

Intercollegiate Athletics  
264 Hickey Gymnasium  
530-752-1111

Intramural Sports, Sports Clubs and Intercollegiate Athletics programs provide a coordinated program of organized sports competition and physical recreational activities to meet student needs at every level of skill and interest.

Intramural Sports is a structured, competitive program involving 36 men's, women's and coed activities with over 13,000 participants. Complementing this highly popular activity is the sports club program. Twenty-six recreational and competitive offerings for men and women attract roughly 1,000 athletes in activities ranging from archery, badminton, crew, horse polo, water and snow skiing to the traditional volleyball, lacrosse, rugby and equestrian events.

Although Intercollegiate Athletics at Davis benefits the campus by fostering school spirit, its primary role is to provide personal development opportunities for as many non-scholarship student-athlete participants as facilities and resources permit. Currently, the program consists of varsity teams in 11 men's sports and 12 women's sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 650 students compete on varsity teams each year.

### **Arts and Entertainment**

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

#### **UC Davis Presents**

Information:

200 B Street, Suite A  
530-757-3199; <http://ucdpresents.ucdavis.edu>

UC Davis Presents brings a wide variety of world-class performing artists to UC Davis to serve the campus and surrounding communities. During the academic year, UC Davis Presents offers concerts and recitals by classi-

cal, jazz and folk music artists; drama; classical, modern and ethnic dance; and lectures by eminent public figures. Tickets for UC Davis Presents events may be purchased at the Campus Box Office (Freeborn Hall, 530-752-1915) or any BASS/TM outlet.

#### **Music**

Information:

Department of Music  
530-752-0888; <http://musdra.ucdavis.edu>

The Department of Music sponsors the UCD Symphony Orchestra, Chorus, Chamber Singers, Early Music Ensemble, Gospel Choir, Concert Band, Jazz Band and small ensemble 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 and the UCD Wind Quintet are in residence on campus. The Department of Music sponsors nearly 100 public concerts each year.

#### **Drama and Theater**

Information:

Department of Dramatic Art  
530-752-0888; <http://musdra.ucdavis.edu>

The Department of Dramatic Art 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 British director to the department each quarter), and graduate students working on Master of Fine Arts degrees in acting 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 University Theatre Season (five major productions of established plays); Dance Concert (student and faculty choreographed dance numbers); and Studio Season (four to six productions). Studio Season features premiere performances of new plays written at UC Davis, productions of established plays, and performance projects conceived and produced for the first time at UC Davis. The final production each year is the Undergraduate Playwright's Festival, a collection of three or four one-act plays written by undergraduates and produced for the first time. These productions are part of the academic program of the department and serve an important purpose in the study of dramatic art. Participation is open to all students.

#### **Art Galleries**

**The MU Art Gallery** (second floor of the MU; 530-752-2885) features a changing series of contemporary and historical art exhibits throughout the school year. Works by professional artists as well as students are on display for periods of 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.





The **Design Gallery** (first floor of Walker Hall; 530-752-4139) explores diverse topics and media with an emphasis on ethnographic arts and consumer cultures. The gallery is internationally known, with innovative exhibitions based on design from a global perspective. Historical cultural artifacts, contemporary functional objects and creative installations are presented in changing spaces designed specifically for each exhibit.

The **Richard L. Nelson Gallery** (first floor of the Art Building; 530-752-8500), 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 **Fine Arts Collection** (Art Building, adjacent to the Nelson Gallery; 530-752-8500), representing various historical periods and cultures, is the Davis campus's major collection of art.

The **Basement Gallery** (Art Building basement) is a student-directed gallery that exhibits the artwork of advanced UC Davis art majors. The exhibitions change biweekly throughout the academic year.

The **Carl N. Gorman Museum** (first floor of Hart Hall; 530-752-6567, Native American Studies) was established in honor of Carl N. Gorman, an artist, advocate and former faculty member of Native American Studies. The museum features changing exhibitions of works by Native American and diverse artists. Selections from the permanent collection of art are also exhibited on a rotating basis throughout the year.

## STUDENT GOVERNMENT

### Associated Students (ASUCD)

Information:  
Student Government Administrative Office  
14 South Hall  
530-752-3632

ASUCD Main Office  
Basement, South Hall  
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. 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, a convenience store,

a photocopy service, Project Recycle, Cal Aggie Camp, Book Exchange, U.S. Post Office and the Coffee House.

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 Classical Notes and Campus Copies, *Housing Viewpoint*, Homecoming, Student Forums, Entertainment Council, and the Whole Earth Festival.

Picnic Day, a UC Davis tradition since 1909, Picnic Day 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 in the *Student Directory*, which combines details about ASUCD services and organizations with the ASUCD student telephone directory, or by visiting the ASUCD office.

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 who serves as the executive aide. 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.

Six **commissions** 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.

- External Affairs deals with off-campus concerns (the regents, UC Office of the President, etc.).
- Internal Affairs recommends policies to improve the quality of nonacademic student life on campus.
- Academic Affairs advocates for student rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure and teacher evaluations.
- Business and Finance makes recommendations to the Senate on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UC Davis' ethnic community, for establishing liaison and achieving rapport with on-campus and off-campus bodies affecting ethnic students and their quality of life while at the university.
- Environmental Policy and Planning addresses all issues and concerns that pertain directly to the campus environment.

The **judicial branch** authority is vested in the ASUCD Supreme Court. The court reviews legislation at the request of any ASUCD member and has the ultimate authority to interpret the ASUCD constitution.

**UC Davis Administrative Advisory Committees**

If you would like to participate in issues affecting the campus community, you may apply for membership on an administrative advisory committee. Each committee advises on policies affecting a specific area, such as athletics, child care, disability issues, 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 administration. Applications are accepted each winter for service on committees the next academic year.

**Graduate Student Association (GSA)**

Information:  
Room 253, South Silo  
530-752-6108; 530-752-5158 (fax); gsa@ucdavis.edu;  
<http://pubweb.ucdavis.edu/Documents/GSA/homepage.html>

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, fax service, travel awards, newsletters and assorted social events. Other professional students are eligible to join GSA by paying a fee.

GSA General Assembly representatives are designated by other students in 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**

Information:  
Student Programs and Activities Center  
Memorial Union, 4th Floor  
530-752-2027

More than 300 registered student organizations at UC Davis, including cultural, social, religious, political, ethnic, academic, international, recreational, performing and service groups, provide students and the entire campus with important educational experiences. The **Student Programs and Activities Center** registers these diverse groups and provides educational programs, advising and support for activities, event planning, leadership development, conflict resolution, resources and campus policies.

In addition to the activities described below, the center administers a number of campus programs: Activities Faire, Club Finance Council, College Bowl, Danzantes del Alma folkloric dance troupe, leadership training programs, campus service awards, and liaison to fraternities and sororities. Center staff assist individual students who want to become involved in activities or start

new organizations. You are encouraged to drop by the center to explore these “hands-on” experiences.

**Cultural Days** is an annual series of programs celebrating the diverse ethnic cultures of the university community. Programs include African Continuum, Asian Pacific Cultural Week, La Raza Cultural Days and the Native American Powwow. Everyone is invited to share in these programs featuring speakers, workshops, films, entertainment and family events.

The **Cal Aggie Marching Band** entertains spectators at athletic, campus and community events. As one of the last remaining “student-run” bands in the nation, the band has a style and personality all its own.

**Cal Aggie Student Alumni Network (CASAN)**

Information:  
Cal Aggie Student Alumni Network (CASAN)  
Walter A. Buehler Alumni and Visitors Center  
530-752-0115 or 530-752-0286; caaa@ucdavis.edu;  
[http://www-caaa.ucdavis.edu/SP\\_casan.html](http://www-caaa.ucdavis.edu/SP_casan.html)

All UC Davis students are encouraged and welcome to become CASAN members. CASAN involves students and alumni in a variety of academic, philanthropic and professional programs that build lasting ties to the university. You may join any time during the academic year; the annual \$15 membership fee includes membership in the Cal Aggie Alumni Association.



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*Picnic Day, UC Davis' annual open house, is the largest student-run event in the nation.*

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**ACADEMIC ADVISING &  
STUDENT RESOURCES**

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## 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 in 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.

### College Advising

#### College of Agricultural and Environmental Sciences

Information:  
Office of the Dean  
228 Mrak Hall  
530-752-0108

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, and second bachelor's, limited and regular status.
- Advice and action on petitions.
- Other services include study plan clearance, College English requirement check, release of holds on registration packets and final evaluation for graduation.

#### Associate Dean of Undergraduate Academic Programs

Information:  
Annie King, Associate Dean  
228 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 informally with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

**Academic Advising Center.** Coordination of the College's Advising Center and the Summer Advising Program is available in the College's Academic Advising Center, 213 Mrak Hall. The Academic Advising Center advises students in the Exploratory Program and the Individual Major.

**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.

### Exploratory Program (non-degree program)

Information:  
College Academic Advising Center  
228 Mrak Hall  
530-752-0610

Are you unsure what major you really want to pursue? If so, you may want to register in the Exploratory Program. With the help of staff in the college's Academic Advising Center and the major advisers, you can explore specialized options, develop your decision-making abilities and ultimately select the major best suited to your needs. For registration purposes, indicate "Exploratory" on your admissions materials. You must declare a major before you complete 120 units (see Declaration of Major in the "Academic Information" chapter).

### Division of Biological Sciences

Information:  
Dean's Office  
202 Life Sciences Addition  
530-752-0410

The associate dean and staff in the Dean's Office offer complete academic advising services for the Biological Sciences major and general advising information about other divisional majors. The office also advises on college and university requirements, policies, and procedures, including PELP, withdrawal, change of major and late actions.

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

**Sections and Advising Centers.** Students entering or intending to declare sectional majors in biochemistry; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; or plant biology should contact the specific section office for academic advising services, where both faculty and staff advisers are available. Students selecting the biological sciences major should contact the Dean's Office for academic advising services.

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

### College of Engineering

Information:  
Undergraduate Office  
1050 Engineering II  
530-752-0557

Information and assistance on academic, career and personal matters is available in the Undergraduate Office, either through direct assistance from one of the staff advisers or through referral to other offices on campus. The Undergraduate Office handles student petitions, transfer evaluation, articulation and degree certifications.

**Advising.** As soon as you arrive on campus, you should 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 can assist you with planning your program.

**Mandatory Advising.** The College has implemented a mandatory advising system through RSVP, the telephone registration system. You are required to meet with your adviser once a year, during a specific quarter, which is determined by the number of units you have completed. When you telephone to enroll in classes for your advising quarter, you will be told that you have an advising hold on your registration. You may enroll in classes for and during this quarter. If you meet with your adviser during this quarter, there will be no difficulties with subsequent registration. If, however, you fail to meet with your adviser during your assigned quarter, you will be dropped from all your classes on the first day of the *following* quarter. Therefore, you have approximately four months to clear an advising hold. For more information on mandatory advising, call the Advising Office at 752-0557.

**Peer Advisers.** A well-developed peer advising system complements faculty and staff advising. Student advisers are available at Bainer Hall, Engineering II, and other locations.

### College of Letters and Science

Information:

Office of the Deans/Undergraduate Education and Advising Office  
200 Social Sciences and Humanities Building  
530-752-0392

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. The office also provides a number of additional services:

- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree. (Applicability of transfer credit toward the major is determined by your major faculty adviser.)
- Provides degree checks to identify remaining 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.

**Faculty Advisers.** New students are assigned to a faculty adviser during their first term of enrollment. If you indicated an interest in a particular program on your application, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

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 (explained below). 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.** If you did not indicate an initial commitment to a particular major program on your application, you will participate in the Academic Options Program, which provides academic advising to lower division students. You will be assisted by an advising team available at sites in each of the university residence hall complexes. Students living off campus should contact the Letters and Science Undergraduate Education and Advising Office early in the quarter to receive their adviser assignments.

**Advising Checkpoints.** 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, pick up Degree Check materials from the Letters and Science Advising Office and consult your 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.

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*The geology department's Professor Geerat Vermeij, a MacArthur Award recipient, measures the shape, texture and size of shells to give us valuable insights into the nature of evolution.*

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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 dean's office peer advisers are available in the Undergraduate Education and Advising Office, 200 Social Sciences and Humanities Building, and on a weekly basis in the campus residence halls to talk with students about their academic concerns.

## Advising Services

Information:  
Advising Services  
111 South Hall  
530-752-3000; <http://advisingservices.ucdavis.edu>

**Academic Peer Advising (APA)** places peer advisers in over 45 departments to help students find the answers to their questions about major requirements, courses and university regulations. The academic peer adviser complements faculty advising by providing a student perspective on the department. The Academic Peer Advising staff is trained to provide information and assistance about graduate schools, career opportunities and college requirements.

The **Orientation and Summer Advising Office** coordinates the Summer Advising and Registration Program, fall quarter Orientation activities and other student assistance and orientation programs for new students. 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.

The **Pre-Graduate School Advising Office** assists students interested in M.A., M.B.A., Ph.D. or teaching credential programs. Services include help in locating graduate school programs in specific fields, completing application forms and statements of purpose, and planning financial options. This unit also coordinates the Undergraduate Research Conference, an annual event open to all undergraduate UC Davis researchers.

The **Pre-Law Advising Office** offers help with admission requirements and program planning to students interested in the legal profession. You can learn about preparing for law school and a legal career through the many seminars and workshops held each year.

The **Health Sciences Advising Office** is an important resource if you are preparing for a profession in the health sciences. Staff and student advisers can provide information on requirements, application procedures, professional school curricula and related options.

**Career and Graduate Study Resource Center**, 114 South Hall, is an extensive reference library managed by Advising Services and the Internship and Career Center. Resources include numerous graduate and professional school catalogs and program directories, admission test materials, fellowship directories, videotapes, and books and journals related to health education. Also available are job listings, general career information materials, and information about companies who recruit at UC Davis. Several personal computers are available to

search the Internet for information on graduate and professional study and job opportunities.

## Educational Opportunity Program (EOP)

Information:  
228 North Hall  
530-752-3472

The Educational Opportunity Program Office serves EOP students by assisting them with their academic, social and personal adjustments to the university environment; coordinates EOP new student orientation programs; and serves as liaison to staff, faculty and administrators. The office's multicultural peer staff is particularly sensitive to differing social, cultural and ethnic concerns. Students interested in pursuing the helping professions can receive training and experience through the Peer Adviser Counselor training program.

EOP Information Office services are also accessible at various locations on campus, such as the Colleges of Agricultural and Environmental Sciences, Letters and Science and Engineering; Learning Skills Center; The House; and all ethnic studies departments. You are invited to telephone or stop by the EOP Information Office on the second floor of North Hall or at any of the outreach locations to find out more about the peer counseling services.

## The First Resort

Information:  
First floor lobby, South Hall  
530-752-2807 or 530-752-3323

The First Resort is a place to go if you are feeling bogged down by university red tape, registration procedures, course selection, choosing a major or other general advising questions. The student advisers here can either answer your questions or put you in contact with others who can. The staff can give you advice and assistance from the point of view of someone who has "been there." The First Resort maintains a referral service, a listing of courses of 1 to 3 units and other valuable resources. If you have a problem, remember—start with The First Resort.

## STUDENT CONDUCT

Information:  
Student Judicial Affairs  
3rd Floor, North Hall  
530-752-1128; <http://sja.ucdavis.edu/sja/>

Students enrolling or seeking enrollment in the university assume an obligation to act honestly, ethically and responsibly in a manner compatible with the university's function as an educational institution. Rules concerning student conduct, student organizations, use of university facilities and related matters are set forth in both university policies and campus regulations.

Standards for student conduct are included in the *UCD Code of Academic Conduct*, the *Student Activities Handbook*, 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 booklet *Administration of Student Discipline*. These policies and regulations are available from the Office of Student Judicial Affairs and on the World Wide Web. A summary of

student conduct expectations is published each quarter in the *Class Schedule and Room Directory*.

### **Misconduct and Discipline**

Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism; cheating; knowingly furnishing false information to the university; sexual or other physical assault; threats of violence; possession of weapons; harassment, including stalking, sexual harassment or “fighting words”; forgery; theft; vandalism; illegal possession, use or sale of drugs or alcohol; 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 a warning to dismissal, and may include restitution and/or assigned community service. Alleged violations of campus or university standards should be referred to the Office of Student Judicial Affairs. If complaints cannot be resolved informally between Student Judicial Affairs, the accused student and the referring party, the case may be referred to a hearing before the Student Conduct Committee, Campus Judicial Board, or a hearing officer. The president of the university, through the chancellor, has ultimate authority for the administration of student discipline.

### **Student Responsibilities**

You are responsible for complying with the announcements and regulations printed in this catalog and in the *Class Schedule and Room Directory*, and with all policies, rules and regulations of the university and this campus. You will not be able to register or receive transcripts of record or diplomas until you have met all university obligations.

### **Student Judicial Affairs**

Information:  
Student Judicial Affairs  
3rd Floor, North Hall  
530-752-1128

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of university policies or campus regulations. The office coordinates the informal resolution process and receives formal complaints for student grievances based on impermissible discrimination or harassment (sexual, racial, religious, handicap, etc.), or on violations of student rights to obtain access to or prevent disclosures from their campus records. The office can help with conflict resolution and provide interpretations of university policies and regulations.

### **Resolving Academic Problems**

#### **Grade Changes**

If you believe you received an incorrect grade due to a clerical or procedural error, ask your instructor to file a grade change form with the Registrar's Office. If you believe you received an incorrect grade due to any type of discrimination, consult the office of Student Judicial Affairs (see above).

### **Other Grievances**

If you need a requirement waiver 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 Grievance Center or the Committee on Student-Faculty Relationships (see below).

### **Discrimination/Harassment**

If you believe that you have been discriminated against or harassed, you may contact the office of Student Judicial Affairs (see above) or the ASUCD Grievance Center (see below) for information and assistance. It is important to seek assistance as soon as possible, as a 30-day time limit applies to some grievance processes. Advice is also available from the Sexual Harassment Information Line (752-2255). Graduate students may contact Graduate Studies (752-0650) and/or the Graduate Student Association (752-6108). Mediation services are available to resolve student grievances. For information, call Student Housing (752-2491).

### **ASUCD Grievance Center**

Information:  
ASUCD Grievance Center  
7 South Hall  
530-754-4131; 530-752-6101 (ASUCD Academic Affairs);  
530-752-3339 (ASUCD Campus Affairs)

The ASUCD 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, prejudicial 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.

### **Committee on Student-Faculty Relationships**

Information:  
Academic Senate Office  
356 Mrak Hall  
530-752-3920

If students with a grievance feel they cannot get satisfaction through normal procedures, they may contact the Committee on Student-Faculty Relationships for assistance. The committee is advisory and can make recommendations to the office having authority to resolve the problem. It may also meet informally with the students involved with the grievance.



## TUTORING AND LEARNING RESOURCES

### EOP Tutoring

Information:  
Learning Skills Center  
Third Floor Voorhies Hall  
530-752-2013

EOP tutoring is a free service for EOP students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in many course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, a limited amount of one-to-one tutoring is also available. Although primary emphasis is on the assignments in your classes, tutorial services may also be used to improve study habits and learning skills. 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.

### Learning Resource Centers

Information:  
Student Housing  
Sue Franck  
530-752-1736

Learning Resource Centers are located in the Segundo, Tercero and Cuarto residence hall areas. They offer the following services to all residence hall students: PC computer terminals (IBM clones and Macintosh) and assistance, free computer software tutoring, a reference library, language tapes, an exam file and a quiet place to study.

### Learning Skills Center

Information:  
Third Floor Voorhies Hall  
530-752-2013

At the Learning Skills Center you can receive help with such things as general study skills, math/science study skills, writing essays and term papers, reading efficiency, English as a second language, time-management skills, test-taking skills and test anxiety reduction.

Learning specialists can help you individually, or you may participate in workshops covering specific areas of study. The Learning Laboratory has self-help tapes and films that let you work at your own pace. The LSC library contains a variety of programmed instructional materials, reference books, preparation materials for the GRE, MCAT and LSAT exams, and a file of course examinations given in past quarters. Most materials may be checked out.

Under certain circumstances, the center also provides individual tutoring sessions for students on academic probation or subject to dismissal. Group and drop-in tutoring is available to all students. Come in and ask about our services, which are free to all UC Davis students.

### Special Transitional Enrichment Program

Information:  
Learning Skills Center  
Third Floor Voorhies Hall  
530-752-2013

Freshman EOP students admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admit-

ted EOP students are encouraged to do so. The program begins in summer and continues through the first academic year, providing preparatory course work and developing academic skills. 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.

## INTERNSHIPS AND CAREER SERVICES

### Internship Programs

Information:  
The Internship and Career Center  
2nd floor, South Hall  
530-752-2855; <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, 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

Information:  
2nd floor, South Hall  
530-752-2855  
World Wide Web: <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. If you are considering dropping out of the university for a term or longer, an adviser can also give you information about internships and employment opportunities.

The Career and Graduate Study Resource Room (1st 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—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 office solicits and maintains job vacancy listings, arranges employment interviews and schedules on-campus recruiting by employers.

### Education and Graduate Placement Services

Information:  
The Internship and Career Center  
2nd floor, South Hall  
530-752-0724

Any student enrolled in the teaching credential program or pursuing a master's or doctoral degree in order to teach should register with the Education and Graduate Placement Office.




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*Innovative engineering students took first prize in the annual FutureCar Challenge with their energy-saving hybrid vehicle that goes 1,000 miles before needing to be refueled or recharged.*

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Services include teaching job vacancy listings, placement files (professional dossiers), special workshops on writing teaching resumes and curriculum vitae, on preparing for interviews, and individual advising.

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. The office sponsors the Graduate Career Options Program for advanced degree candidates originally planning a teaching career and now considering other career options.

### **Human Corps Program**

Information:  
The Internship and Career Center  
126 South Hall  
530-752-3813

Human Corps is the student community services program at UC Davis. 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 take many forms, from a one-day activity to a long-term commitment.

The Human Corps is a referral center for students who want to perform community service and as 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.

## **STUDENT RESOURCE AND INFORMATION CENTERS**

### **Cross-Cultural Center**

Information:  
Winnie LaNier, Director  
Corner of East Quad and Shields road  
530-752-4287; 530-752-5067 (fax);  
<http://pubweb.ucdavis.edu/documents/CCC/index.html>

The Cross-Cultural Center fosters a multi-ethnic and multi-cultural community through educational and cultural programs, and leadership development opportunities. Everyone is welcome and encouraged to participate in the many programs, special events and activities sponsored by the center.

### **Lesbian, Gay, Bisexual and Transgender Resource Center**

Information:  
University House, Room 105  
530-752-2452; <http://lgbtcenter.ucdavis.edu>

The Lesbian, Gay, Bisexual and Transgender (LGBT) Resource Center has information and resources about lesbian, gay, bisexual and transgender issues and offers a safe, supportive environment to meet other members of the Davis community. Students who are studying or researching these issues are encouraged to use the center's resources. The center also serves as a meeting place for local organizations or support groups. Resources include a library with books on topics ranging from domestic partnership issues to lesbian humor, and local and national newspapers and magazines; a resource database and files on local resources, including health professionals, legal services, clubs, organizations and community contacts; and a bulletin board exchange, where community members may advertise special events and services. The LGBT Resource Center is staffed by volunteers and is open Monday through Friday; call for daily hours.



## Rape Prevention Education Program

Information:  
Fire and Police Building, Kleiber Hall Drive  
530-752-3299;  
<http://pubweb.ucdavis.edu/Documents/RPEP/RPEP.HTM>

The Rape Prevention Education Program (RPEP) explores myths and expose the realities of sexual assault, focusing on prevention through education. The program offers discussions and workshops; self-defense classes; short-term counseling, referrals and support groups for victims of rape, sexual assault, or incest survivors; 24-hour crisis intervention and advocacy for victims of sexual violence; training for peer counselors and professionals; and a circulating library of books, videos and articles on sexual assault and related issues.

RPEP has student work-study positions and a volunteer staff; call for drop-in hours or to make an appointment.

## Services for International Students and Scholars (S.I.S.S.)

Information:  
Services for International Students and Scholars  
530-752-0864

Services for International Students and Scholars assists international students, faculty and researchers throughout their programs of study, teaching and research at UC Davis, offering orientation, personal and cultural advising, information and assistance with U.S. Immigration and Naturalization Services regulations. The office serves as a liaison with home governments and sponsors, and provides orientation to the U.S. university system.

All new and transfer international students must attend a special orientation program held just before each quarter begins. The orientation helps new students with registration, class enrollment, making housing arrangements, immigration regulations, and finding campus services and community resources. Orientation for new international faculty and researchers is held weekly.

Students and scholars should report to S.I.S.S. as soon as possible after arriving in Davis.

## Women's Resources and Research Center (WRRC)

Information:  
North Hall, First Floor  
530-752-3372; 752-0222 (fax); <http://wrrc.ucdavis.edu/wrrc>

The Women's Resources and Research Center educates the campus community about women's issues and concerns, promotes an understanding of the role and impact of gender in our lives and in our society, helps women of diverse backgrounds achieve their intellectual, professional and personal goals, and advocates for women's full inclusion, equality and advancement.

The WRRC's staff can answer questions, locate resources and help you with personal, academic or work-related concerns. Services and resources include lectures, workshops and forums; a library staffed by a full-time librarian; resource listings of campus and community services such as health care, counseling, child care, women's organizations and legal resources; child emergency notification service for student parents; and specialized programs, discussion groups and individualized consultation for faculty and graduate students on research, academic, career and personal topics.

## Student Special Services

Information:  
160 South Silo  
530-752-2007

Student Special Services coordinates a variety of programs and services to meet the special needs of students.

## Disability Resource Center

Information:  
Disability Resource Center (DRC)  
160 South Silo  
530-752-3184 (voice) or 752-6833 (TTY);  
<http://www.drc.ucdavis.edu>

The Disability Resource Center (DRC) coordinates specialized support services and accommodations for students with documented disabilities. Accommodations are directly related to disability-based limitations and may include alternate exam arrangements, materials in alternate formats, notetakers, sign language and oral interpreters, real-time captioning, assistive listening devices, on-campus shuttle service, and disability management counseling.

## Reentry Student Services

Information:  
Reentry Student Services  
160 South Silo  
530-752-2005

Reentry Student Services helps students who have returned to the university after several years of life and work experience. The office provides admissions assistance, information, orientation and peer support, and provides referral assistance through the Reentry Resource Network. The office sponsors an annual Reentry Day for prospective reentry students on the last Saturday in February.

## Transfer Student Services

Information:  
Transfer Student Services  
160 South Silo  
530-752-2200

Transfer Student Services helps students who have transferred from other institutions of higher education, coordinating transfer student matters among existing student services units to ensure an easy and smooth transfer to the university. It also sponsors special receptions and workshops for new transfers and publishes an annual *Transfer Guide* of available campus services.

## Veterans Affairs

Information:  
Veterans Affairs Office  
160 South Silo  
530-752-2020

Veterans Affairs assists veterans, dependents and reservists with a number of services, including 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. The office can give you the forms, information and advice to process your claim.





**ACADEMIC  
INFORMATION**

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## Registration

Information:  
Office of the Registrar  
12 Mrak Hall  
530-752-2973; <http://registrar.ucdavis.edu>

Registration is the way in which you become a student at the university. Every UC Davis student must register each quarter. Registration includes enrolling in classes via RSVP, the telephone registration system; paying fees and other financial obligations; filing your current address with the Office of the Registrar; and completing and filing other information forms.

If you are a *new* or *reentering* student you must also:

- Have a photo ID picture taken.
- Submit a Statement of Legal Residence (see Appendix).
- Return the completed Medical History form, evidence of rubella immunity, results of a tuberculin skin test and the Insurance Information Request form. These forms are mailed to each new student from the Student Health Center.

**Change of Name.** Petitions to change your name on official university records may be obtained from the Office of the Registrar. (Students planning to graduate should file this petition no later than the fifth week of the quarter in which they intend to graduate.)

**Change of Address.** Be sure to inform the Office of the Registrar of any change of address. Important registration materials, information and announcements are mailed to students throughout the year, so keep your campus/local mailing address, your billing address and your permanent address up to date. Failure to file your current address can result in a hold on your registration. You can update your address in three ways:

- Complete a Change of Address form, available at the Office of the Registrar.
- Call our Voice Mail Form at 754-9427.
- Correct your information on the “Student Data” section of your RSVP registration form and turn it in to the Office of the Registrar.
- Use the World Wide Web form available from the “Student” menu of the Office of the Registrar web site.

New graduate students who have been registered previously at UC Davis as undergraduates are considered to be new students.

## Late Registration

Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of \$50 to defray the extra clerical costs of late registration. Registration after the deadline will be allowed only under conditions where action or inaction on the part of the university delays registration. A recommendation from an appropriate administrative unit will be required, and the registration fee must be paid with cash, cashier’s check, credit union check, university check or fee credit.

## Enrolling in Courses

**RSVP.** Students enroll in courses using the UC Davis telephone registration system, RSVP (Register Students Via Phone), at 530-752-7787.

The *Class Schedule and Room Directory*, available several weeks before the start of each quarter, explains registration procedures, gives class meeting times and locations, changes to the *General Catalog*, and the most up-to-date information on fees and RSVP.

The Office of the Registrar World Wide Web site, <http://registrar.ucdavis.edu>, includes the each quarter’s “Schedule of Classes,” RSVP information, the “Open Courses” list, *General Catalog*, academic calendar and other general information, and a link to WIRES (WIRES gives registered students access to their grades, current schedule and account balance).

**Registration Priority.** Access to RSVP is by priority groups. The groups are established according student class level, as determined by the number of units completed. Undergraduate classification is determined by the number of quarter units you have completed:

| Class Level | Units        |
|-------------|--------------|
| Freshman    | 0.0 — 44.9   |
| Sophomore   | 45.0 — 89.9  |
| Junior      | 90.0 — 134.9 |
| Senior      | 135.0 —      |

**Study List.** You are officially registered in all courses listed on your individual study list. You are responsible for completing each of the courses. A course that is on your study list and for which you did no work that could be graded is reflected on your official transcript by the notation “ENW” (Enrolled–No Work Submitted).

To confirm your study list (class schedule), you can call RSVP, view and print your class schedule at Office of the Registrar Kiosk in Mrak Hall lobby, or access WIRES at <http://www.ucdavis.edu/ucnames/wires>. You can also check your grades using RSVP, the Kiosk, or WIRES.

## Adding and Dropping Courses

You may adjust your schedule by adding or dropping courses using RSVP until the published deadlines. The last day to drop a course via RSVP is the tenth day of instruction. The last day to add a course via RSVP is the 15th day of instruction. The *Class Schedule and Room Directory* for each quarter lists the add and drop deadlines and explains how to use RSVP to adjust your

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*History professor Alan Taylor’s love for a novel by James Fenimore Cooper led him to write William Cooper’s Town, which won a Pulitzer Prize.*

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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 deadlines each quarter to add or drop courses.

### 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 available from the Office of the 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 for retroactive adds are available from the Office of the Registrar. Each petition must include the reason for the student's failure to add the course during the quarter in which it is 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

Students are normally expected to graduate in 12 quarters (four years). To do this, **students should plan to complete an average of 15 units per quarter** (15 units per quarter for 12 quarters totals 180 units). It is understood that for various reasons students will occasionally need to take fewer than 15 units per quarter. However, students must meet the minimum progress requirements of the campus.

**Minimum Progress Requirements.** Minimum progress is defined as an average of 12 units (including workload units) passed per quarter, calculated at the end of every quarter for the preceding three quarters of enrollment. Undergraduate students falling below this required



average may be subject to academic disqualification. Under minimum progress, a student will earn the 180-unit minimum degree requirement within 15 quarters (5 years) of enrollment. Normal progress would achieve 180 units in 12 quarters.

Minimum progress requirements do not apply to students who have been granted part-time status or to students who have their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a recent death in the immediate family, or a serious accident involving the student.

**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 for insurance and financial aid purposes.

**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.

### Part-Time Student Status

If, for reasons of occupation, family responsibility, health or, for one term only, graduating senior status, you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. 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 the instruction. Minimum progress requirements

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*Students have access to the collections of all UC libraries via MELVYL, the online catalog of books and journals.*

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are waived for part-time students. Undergraduate petitions are available at the Office of the Registrar and require approval by the Registrar. Graduate petitions are available at Graduate Studies and approved by the Dean of Graduate Studies. 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'll find a complete list of the majors offered at UC Davis in a chart at the front of this catalog.

### Declaration of Major

#### College of Agricultural and Environmental Sciences.

Students must declare a major by the time they have completed 120 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 obtainable at the Office of the Registrar or dean's office and file the petition with the dean's office. If you have completed 120 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.

**College of Engineering.** Students must declare a major when they apply to the College of Engineering. Their freedom to change majors thereafter may be limited.

**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 materials. Such a hold would be removed only when your Declaration of Major petition is filed in the deans' office. Petitions can be obtained from faculty advisers, department offices or the Office of the Registrar. 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 to withdraw from that major by the dean, 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 will need the consent of the department or committee in charge of your proposed new major. 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 2.0.

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). It is not possible to change or declare a major in the quarter in which you file to graduate.

**College of Engineering.** The above provisions may not apply to students in the College of Engineering, whose freedom to change majors is limited. Please contact the Engineering dean's office for specific change-of-major requirements.

### Change of Major Accompanied by Change of College

A change petition, available at the dean's office and Office of the Registrar, must be endorsed by a faculty adviser of the new major you are selecting and signed by the dean of the college from which you wish to transfer. In addition, admission to the new college will require that dean's approval. Permission to transfer from one college to another may be denied or deferred if you are in academic difficulty or have a GPA of less than 2.0 in courses that are required by the new major.

**College of Engineering.** You must submit your petition for change of major by the tenth day of instruction and declare a specific major at this time. You may submit petitions for transfer into the College of Engineering from another UC Davis college only if you are in good academic standing and are making minimum progress towards a degree. If you have completed more than 120 units (excluding AP units), you will not be allowed to file a change of major petition, except by appeal. Your appeal must include a quarter-by-quarter plan of study before a review of your appeal will be considered.

*Requirements for students changing their majors to Aeronautical Engineering, Biological Systems Engineering, Chemical Engineering, Civil Engineering, Food Engineering, Materials Science, or Mechanical Engineering or double majors within these fields:* You must have completed at least 40 units as a registered student on the Davis campus; have successfully completed Mathematics 21A, 21B, and 21C and Physics 9A (or their equivalents); have and maintain a minimum GPA of 2.5 in all mathematics and physics course work in the Mathematics 21 and 22 series and in the Physics 9 series; and have a minimum UC GPA of 2.5. (Petitions submitted for a change of major to the Department of Civil and Environmental Engineering will be accepted on a first-come, first-served basis, subject to available space. If you transfer to a major in the College of Engineering other than Civil Engineering, you may not later change into the Civil Engineering major.)

*Requirements for students changing their majors to Electrical Engineering, Electrical Engineering/Materials Science and Engineering, or Computer Engineering, or double majors that include any of these fields:* You must be a registered student at UC Davis for at least one quarter before petitioning for a change of major; be in good academic standing; be making minimum progress towards a degree with an overall UC GPA of at least 2.5; and

have completed Mathematics 21A, 21B, and 21C; Engineering 5 or Computer Science Engineering 30, Physics 9A, and Chemistry 2A with a GPA of at least 2.75 in these courses and have and maintain a GPA of 2.75 in all technical course work. *Requirements for students changing their major to a **double major in Electrical and Computer Engineering***: You must fulfill all of the preceding requirements, and you must be a registered student at UC Davis for at least one quarter before petitioning for the double major, have completed all lower division requirements, and have a GPA of at least 3.2. You must be able to demonstrate that the double major can be completed in five years (for a student who began UC Davis as a freshman) or three years (for a student who transferred to UC Davis).

*Requirements for students changing their majors to Computer Science and Engineering or a double major that includes Computer Science and Engineering*: You must be a registered student at UC Davis for at least one quarter before petitioning for a change of major; be in good academic standing; be making minimum progress towards a degree with an overall UC GPA of at least 2.5; and have completed Mathematics 21A, 21B, and 21C; Computer Science Engineering 20, 30 and 40; and Physics 9A with a GPA of at least 2.75 in these courses. If you have completed the equivalent course work at another institution, you must have a GPA of 3.0 in the equivalent course work and have a minimum of two UC Davis Computer Science Engineering (ECS) courses (with the exceptions of ECS 10, 15, 15AT, and 167) with a GPA of at least 2.75 in all ECS courses and have and maintain a GPA of 2.75 in all technical course work.

### Multiple Majors

**College of Agricultural and Environmental Sciences.** Because of similarity in course requirements for many of the major programs in the college, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major, or of adopting one or more of the minor programs offered by the college to complement your major. If you complete two majors, you may petition for recognition that you have completed all the requirements for study of a major in addition to your selected major. 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.

**College of Engineering.** Engineering has several established double majors. Enrollment in combinations of engineering majors other than the established double majors or in an engineering major and a non-engineer-

ing major may be possible. A change of major petition is required; this should be filed in the Undergraduate Office and is subject to approval. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

The Department of Computer Science does **not** allow double majors of Computer Science Engineering and Computer Engineering, **or** Computer Science Engineering and Electrical Engineering, **or** Computer Science Engineering and Computer Science.

If you want to double major in any of the over-subscribed majors listed above, you will be subject to the additional restrictions for transferring 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.
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.

All degree requirements must be completed within the 225-unit limit.

Combination proposals that *cannot be approved* are two or more majors

1. in the following group: biochemistry; biological sciences; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; and plant biology; or,
2. 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.

**College of Engineering.** Enrollment in a combination of an engineering major and a non-engineering major may be possible. A change of majors petition must be filed in the Undergraduate Office and is subject to approval. 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. 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; biological sciences; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology and behavior; or plant biology.

### 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 totalling 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 **by the fourth full week of the fifth quarter before graduation.** If you wish to undertake an individual major, request the appropriate forms from your dean's office. Program requirements are outlined under Individual Major in the Programs and Courses section of this catalog. The College of Engineering does not offer an individual major.

## 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 "Programs and Courses" chapter of this catalog under the department that offers them. You will find a complete list of the minors offered at UC Davis in a chart at the front of this catalog.

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 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.

To request certification of a minor, **you must have a grade point average of 2.0 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, these 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.

No minors are available in the College of Engineering, although students in Engineering may, with the approval of the Engineering dean's office *and* the adviser in the minor department, elect a minor in either the College of Letters and Science or in the College of Agricultural and Environmental Sciences. You must pick up a minor petition in the office of the college that offers the minor you want and have the completed petition approved by the minor adviser and then certified by the Undergraduate Office of the College of Engineering. A minor is not required and may not be used to substitute for approved Humanities and Social Sciences (HSS) electives. The Undergraduate Office in the College of Engineering has the primary responsibility for certifying minors for engineering students and should be consulted before you begin the minor sequence.

## 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 the "Carnegie unit," which assigns 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 (if your college or department provides them) 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 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 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. The final results will be reported to the Office of the Registrar, which will assign you the appropriate grade and grade points. 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.

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 and Outreach Services for evaluation. See the Summer Sessions bulletin for detailed information.

### **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 2.0 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 Registrar.

### **Summer Sessions**

44 Mrak Hall  
One Shields Avenue  
Davis, CA 95616-8715  
530-752-1641 or 1-800-VIP-2738;  
summer-sessions@ucdavis.edu  
International programs: 1-800-SUMMER6;  
<http://summer-sessions.ucdavis.edu>

Every summer, several thousand 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. More than 6,700 students enrolled in 1997.

Summer Sessions offers more than 200 lower and upper division courses 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.

In 1999, the Office of Summer Sessions will offer two six-week sessions, which will run from June 28 to August 6 and from August 9 to September 17. All UC Davis undergraduates will automatically receive our 1999 Summer Sessions Catalog and application materials by the end of April; non-UC Davis undergraduates should contact us by phone, e-mail or in writing to the address above.

International and special programs offered in 1998 included the Summer Institute of Fine Arts; Literature of the Wilderness, in McCall, Idaho; the study of volcanoes in Hawaii; Rivers of California; and other special topic programs of different lengths. In 1998, students had the opportunity to study in England, France, Italy, Jamaica, Japan, Korea and Peru.

### **UC/CSU/Community College Cross Enrollment**

If you are interested in taking a particular class a nearby CSU 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 1914, also known as the Killea Bill, 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 service counter at the Office of the Registrar, 12 Mrak Hall, for information.

### University Extension

Credit for a limited number of units may be granted for specified University Extension courses, subject to the regulations of the individual colleges (see Bachelor's Degree Requirements section). No grade points are assigned for courses completed through University Extension.

## 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 Room Directory*. The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual 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 Room Directory* lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the quarter. This information is available in the *Class Schedule and Room Directory* each term so that you can avoid final examination conflicts.

The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student involved in the change. Any student who does not consent in writing to a different time must 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 alternate schedule. 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. 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.

**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 (course descriptions will include the statement, "no final examination").

At the instructor's option, the final examination may be completely or in part a take-home examination. 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 Room Directory*.

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.

**Disabilities.** Students with documented disabilities may be entitled to in-class accommodations. The student shall provide the instructor with a letter from the Disability Resource Center (DRC) 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. The instructor should consult with the student and DRC 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 and at 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 conflicts 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   | <i>excellent</i>                                                                  |
| B   | <i>good</i>                                                                       |
| C   | <i>fair</i>                                                                       |
| D   | <i>barely passing</i>                                                             |
| F   | <i>not passing (work so poor that it must be repeated to receive recognition)</i> |
| P   | <i>passed (grade C– or better)</i>                                                |
| NP  | <i>not passed</i>                                                                 |
| S   | <i>satisfactory</i>                                                               |
| U   | <i>unsatisfactory</i>                                                             |
| I   | <i>incomplete (work is satisfactory but incomplete for a good cause)</i>          |
| IP  | <i>in progress</i>                                                                |
| ENW | <i>enrolled–no work submitted</i>                                                 |

The grades A, B, C and D may be modified by a plus (+) or minus (–).

The notation “ENW” (Enrolled–No Work Submitted) will be recorded on a student's official transcript for any course on the student's study list for which, to the best of the instructor's knowledge, the student did not present any work subject to grading.

### Grade Points

Grade points are assigned each letter grade as follows:

|          |          |            |
|----------|----------|------------|
| 4.0 = A+ | 2.3 = C+ | 0.0 = F    |
| 4.0 = A  | 2.0 = C  | 0.0 = I    |
| 3.7 = A– | 1.7 = C– | 0.0 = P/NP |
| 3.3 = B+ | 1.3 = D+ | 0.0 = S/U  |
| 3.0 = B  | 1.0 = D  |            |
| 2.7 = B– | 0.7 = D– |            |

### Grade Point Average (GPA)

The grade point average is computed on courses taken at the University of California, with the exception of courses taken in University Extension. 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 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 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).

## 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 Davis campus.** Consequently, at least two thirds of the units completed in residence at 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 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 Engineering:** Students enrolled in any undergraduate major offered by the College of Engineering may **not** exercise the Passed/Not Passed grading option for any course work presented in satisfaction of course or unit requirements for any undergraduate major or degree offered by the College of Engineering. Additionally, undergraduate students may not exercise the P/NP option for any course offered through the College of Engineering. Courses offered only on a P/NP basis are acceptable for specific program area degree requirements.

**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. (See above for electing P/NP grading for a course graded in-progress.)

### 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 situation of equal gravity.)

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 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. At the time of graduation, however, any remaining I grades are included when your grade point average is computed, in order to determine whether you have achieved the 2.0 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, however, 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 this catalog and the *Class Schedule and Room Directory*, to verify their schedules via RSVP, 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 courses repeated. 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 a S/U basis. (Courses in which a grade of U was received may be repeated on a 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 Not Passed) 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 in a number of ways:

- Call RSVP to hear your grades, available at the dates published by the Office of the Registrar
- Check your grades using a Web browser by accessing WIRES at: <http://www.ucdavis.edu/ucnames/wires>
- Use the Office of the Registrar Kiosk, Mrak Hall lobby
- Have your grades mailed to you, by bringing a stamped, self-addressed envelope with your student photo ID card to the Office of the Registrar before the end of the quarter

### Transcripts

A record of each student's academic work at UC Davis is retained permanently by the Office of the Registrar. Copies of your official transcript may be obtained from that office for \$4.00 a copy. Application for a transcript of record should be made at least two weeks in advance of the time needed.

Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University 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.

The **qualitative standards** of scholarship require that a student maintain a C average (2.0) 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 2.0, but not less than 1.5, for the quarter,
- or**
- is less than 2.0 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 1.5 for the quarter,
- or**
- the student's grade point average is less than 1.5 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.

In the case of probation or disqualification the official transcript will state "not in good standing." Once a student has met qualitative standards for scholarship, the notation will be removed from the transcript.

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 assumed that a student will earn the 180-unit minimum degree requirement within 12 quarters (four years). This means students must plan to complete, on average, 15 units per quarter. Because occasions arise which prevent students from achieving normal progress towards the degree, the campus has established minimum progress requirements, to which students must adhere. Minimum progress is defined as an average of 12 units passed per quarter, calculated at the end of every quarter for the preceding three quarters.

A student will be placed on **probation for quantitative reasons** if the student fails to make minimum progress for that quarter. The notation "warning—minimum progress" will be noted on the grade report for a quarter in which the student has passed less than 12 units. Students calling RSVP to check their grades will hear a warning that they are not in good academic standing; if they print their grades from the Office of the Registrar Kiosk, they will see the same warning on their printout.

A student will be subject to **disqualification for quantitative reasons** if the total number of units passed at UC Davis is **less than 36**, calculated at the end of every quarter for the preceding three quarters of enrollment. The notation “minimum progress—subject to academic disqualification” will be noted on the grade report the first time the total number of units passed at UC Davis is **less than 36**, calculated at the end of every quarter for the preceding three quarters of enrollment.

Quantitative standards are not reflected on the official transcript.

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
- Repeated courses passed to improve D or F grades
- 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 quarter of registration just preceding 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)

The dean of the student’s college may grant a student a minimum progress variance of one or more quarters for an acceptable reason.

Minimum progress requirements do not apply to students who have part-time status or to students who have their dean’s approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a recent death in the immediate family, or a serious accident involving the student.

### Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which you are enrolled. Such dismissal is from the University of California system and not simply the college or the Davis campus. Should a former Davis student later wish to be readmitted on the Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed. If you are dismissed from your college, you will automatically receive a full refund of registration fees paid.

See your faculty adviser or go to the dean’s office of your college if you need academic advising about probation and dismissal.

### Transfer with Scholastic Deficiencies

To transfer from one University of California campus to another, or from one college or school to another on the same campus, a disqualified or probational student must obtain the approval of the dean whose jurisdiction is being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school or campus.

## HONORS AND PRIZES

### Scholarships

Information:  
228 Voorhies Hall  
530-752-3153; <http://faoman.ucdavis.edu/schol.htm>

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 are accompanied by a financial honorarium or stipend.

### Deans’ Honors Lists

According to 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 outside deans’ offices, and a notation of these honors will be placed on each student’s permanent record by the Office of the 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 explanation below.)

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

Grade point averages from the winter quarter previous to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 1998. These averages will be used through winter 1999.

| Percent Determining Cut-Off Point | Grade Point Average by College          |             |                     |
|-----------------------------------|-----------------------------------------|-------------|---------------------|
|                                   | Agricultural and Environmental Sciences | Engineering | Letters and Science |
| 2%                                | 3.883                                   | 3.858       | 3.888               |
| 3%                                | 3.844                                   | 3.809       | 3.850               |
| 4%                                | 3.807                                   | 3.773       | 3.808               |
| 6%                                | 3.742                                   | 3.700       | 3.729               |
| 8%                                | 3.667                                   | 3.618       | 3.671               |
| 12%                               | 3.550                                   | 3.506       | 3.565               |
| 16%                               | 3.444                                   | 3.391       | 3.490               |

An honors notation is made on students’ diplomas and on their permanent records in the Office of the 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 departments




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*No matter what your mode of locomotion, UC Davis' level terrain makes it easy to get around.*

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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. A notation shall appear on the student's official transcript indicating that the 194H Honors Thesis was completed. 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 dean's 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 3.5 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.

### **Davis Honors Challenge**

Information:  
530-752-9797; <http://www-honors.ucdavis.edu>

The Davis Honors Challenge (DHC) is a campuswide program for highly motivated students interested in

enhancing their education through special courses, closer contact with faculty and dynamic interaction with academic peers.

DHC participants take two honors courses and one problem-oriented interdisciplinary seminar per academic year. The seminars are designed to foster critical thinking and analytical interpretation, improve oral and written communication skills, enhance research skills, provide experience with group dynamics and collaborative exploration of problems, and develop familiarity with electronic communication and visual presentations.

DHC seminars 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 that require the best intellectual efforts of us all. Honors courses and small honors sections of regular courses also encourage individual student participation and self-challenge. Students satisfactorily completing the Davis Honors Challenge will receive transcript notation for each academic year of participation.

Entering first-year students who file a "Statement of Intent to Register" at UC Davis will be 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. In addition, a limited number of third-year students will be admitted to an upper division honors pilot program.

### **Integrated Studies**

Information:  
530-752-9797

Integrated Studies is a campuswide, invitational, first-year residential honors program associated with the Davis Honors Challenge. Integrated Studies offers theme-oriented, specially designed, interdisciplinary honors courses that satisfy General Education requirements. Approximately 70 students live in an Academic Residential Community on campus and take three limited-enrollment honors courses open only to Integrated Studies students and two integration seminars.

HOLDERS of Regents Scholarships, the university's most prestigious scholarship awards, are guaranteed places in Integrated Studies. Other highly qualified students are also invited to participate and are selected to create a balanced community of students from all three undergraduate colleges and the Division of Biological Sciences.

### **Prizes and Awards**

The University Medal is the highest campus honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College or School Medal is 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 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 Engineering.** Each year outstanding senior students in engineering are recommended by the faculty of the College as nominees for the M.S. Ghausi Medal. Academic excellence is the primary basis for selecting the recipient of the award.

**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 from a disciplinary area other than that of the College medalist. 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

This award recognizes students who have distinguished themselves through their excellence in and contribution to undergraduate research and encourages others to become involved in these types of efforts. Recipients of the award receive a certificate of commendation and inscribed plaque from the president of the university.

In conjunction with the Chancellor's Award, Professor Dean Simonton of UC Davis' Department of Psychology established an endowment for funding a cash prize of \$500 for each year's student recipient.

### 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)
- Golden Key (All colleges and schools)
- Kappa Omicron Nu (Family and Consumer Sciences)
- 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 **Announcement of Candidacy** with the Office of the Registrar for the quarter in which the candidate plans to receive the degree. The dates for filing are published in the Academic Calendar at the front of this catalog and the quarterly *Class Schedule and Room Directory*.

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).

### Leave of Absence: Planned Educational Leave Program (PELP)

The Planned Educational Leave Program allows students to suspend academic work at UC Davis, leave the campus and later resume studies at UC Davis with a minimum of procedural difficulties.

Any registered student on the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program, although restrictions may be imposed on the number of times a student can participate in the program. To apply for PELP, first complete an application, including a brief written explanation of the reason for leaving the campus and stating when you intend to resume academic work at UC Davis. You must then obtain approval from the dean of your college or school. Applications for PELP are available at the Office of the Registrar and should be filed with the Office of the Registrar **no later than the first day of instruction**.

An application fee of \$40 is charged, payable when you enroll in the PELP program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the maximum leave is one full academic year. Applications for PELP should be filed no later than the first day of instruction. While approved applications can be accepted as late as the tenth day of instruction, filing after the first day of instruction will entitle you to only a partial refund of fees paid, in accordance with the Schedule of Refunds. The Schedule of Refunds refers to **calendar days** beginning with the first day of instruc-







*More than two miles of paths in the Arboretum provide lots of space to bike, jog or just watch the ducks.*

tion. 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 Registrar. (See the “Fees, Expenses and Financial Aid” chapter.)

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 should carefully evaluate the desirability of taking academic work while away from the campus during PELP.

Readmission is guaranteed assuming you resume regular academic work at the agreed-upon date and satisfy any holds that may have been placed on your registration. Students who do not return at the agreed-upon date and who do not officially extend their leave will be automatically withdrawn from the university.

You will not be eligible to receive all 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 Planned Educational Leave 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 what effects the Planned Educational Leave will have on their status. Grants and other financial aids will be discontinued for the period of the leave, but every 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. In order to withdraw, you must first obtain approval from the dean of your college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades.

Petitions for withdrawal (Notice of Cancellation/Withdrawal) are available at the Office of the Registrar. The following signatures are required on withdrawal peti-

tions: laboratory or course instructor; dean of your college or graduate faculty adviser; Student Aid Accounting Office. A percentage of fees paid may be refunded, 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 returned to the Office of the Registrar.

If you are receiving financial aid, you must report your change of status immediately, in person or by mail, to the Financial Aid and Student Aid Accounting Offices. If you are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

**Retroactive Withdrawals.** Petitions for retroactive withdrawals may be obtained from the Office of the Registrar. 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 over 150 major programs in a wide variety of disciplines offered by the three undergraduate colleges. Minor programs, more than 60 in all, are offered by the College of Agricultural and Environmental Sciences and the College of Letters and Science.

### College of Agricultural and Environmental Sciences

Office of the Dean, Academic Advising Center  
228 Mrak Hall  
530-752-0108; <http://www.aes.ucdavis.edu>

Major programs in the College of Agricultural and Environmental Sciences highlight the multiple connections among the environment, plant and animal systems, and human health and development, all within the larger context of the quality of life in the global economy. The majors fall into four broad areas of study described below. Majors in a fifth area of study, the biological sciences, are offered through both the College of Agricultural and Environmental Sciences and the College of Letters and Science and are administered by the Division of Biological Sciences. Refer to the following section, "Division of Biological Sciences," for more information. The College of Agricultural and Environmental Sciences also offers two collegewide degree programs and two collegewide non-degree programs.

#### The Undergraduate Programs

##### Animal Biology

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.

##### Majors:

Animal Biology, B.S.  
Animal Science, B.S.  
Animal Science and Management, B.S.  
Avian Sciences, B.S.  
Biotechnology, B.S. (see also Plant Science)  
Entomology, B.S.  
Wildlife, Fish and Conservation Biology, B.S. (see also Environmental and Resource Sciences and Policy)

##### Minors:

Agricultural Entomology (Entomology)  
Animal Science  
Apiculture Entomology (Entomology)  
Avian Sciences  
Entomology  
Insect Ecology (Entomology)  
Medical-Veterinary Entomology (Entomology)  
Nematology

##### Environment

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:

Atmospheric Science, B.S.  
Environmental and Resource Sciences, B.S.  
Environmental Biology and Management, B.S.  
Environmental Horticulture and Urban Forestry, 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.  
Wildlife, Fish and Conservation Biology, B.S.  
(see also Animal Biology)

##### Minors:

Applied Biological Systems Technology (Biological and Agricultural Engineering)  
Atmospheric Science (Land, Air and Water Resources)  
Energy Policy (Environmental Studies)  
Environmental Policy Analysis (Environmental Studies)  
Environmental Toxicology  
Geographic Information Systems (Biological and Agricultural Engineering)  
Geographic Studies (Environmental Design)  
Hydrology (Land, Air and Water Resources)  
Soil Science (Land, Air and Water Resources)

#### Human Health and Development

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 Managerial Economics, B.S.  
Community and Regional Development, B.S.  
Community Nutrition, B.S.  
Design, B.S.  
Dietetics, B.S.  
Fermentation Science, B.S.  
Fiber and Polymer Science, B.S.  
Food Biochemistry, B.S.  
Food Science, B.S.  
Human Development, B.S.  
Nutrition Science, B.S.  
Textiles and Clothing, B.S.  
Viticulture and Enology, B.S.

##### Minors:

Aging and Adult Development  
(Human and Community Development)  
Agricultural and Managerial Economics  
(Agricultural and Resource Economics)  
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)  
Nutrition and Food (Nutrition)

Nutrition Science (Nutrition)  
Textiles and Clothing

### Plant Science

These majors provide a strong background in plant biology in the context of agricultural and environmental systems and societal needs. The Agricultural Systems and Environment major couples a strong background in plant biology with an ecological understanding of food and fiber production systems. The Crop Science and Management major provides a foundation in both the biological and economic principles that underlie management decisions in agribusiness. The Plant Biology major provides a basic background in all areas of plant biology, including plant development, plant protection, biotechnology and postharvest physiology.

#### Majors:

Agricultural Systems and Environment, B.S.  
Biotechnology, B.S. (see also Animal Biology)  
Crop Science and Management, B.S.  
Plant Biology, B.S.

#### Minors:

Agricultural Computing and Information Systems  
(Agronomy)  
Environmental Horticulture  
Precision Agriculture  
(Biological and Agricultural Engineering)

### 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.  
International Agricultural Development, B.S.

#### Minors:

International Agricultural Development  
Science and Society

#### Non-degree programs:

Exploratory  
Science and Society

## Division of Biological Sciences

### (College of Agricultural and Environmental Sciences and College of Letters and Science)

Dean's Office  
202 Life Sciences Addition  
530-752-0410; <http://www.dbs.ucdavis.edu>

The Division of Biological Sciences is an intercollege unit that coordinates campuswide programs in basic biology and administers undergraduate programs in the core disciplines of biology on behalf of the College of Agricultural and Environmental Sciences and the College of Letters and Science.

The division is organized into five sections that represent major themes of modern biology: Evolution and

Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. The individual sections offer seven specialized majors, each focusing on one of the core disciplines of basic biology. The major in Biological Sciences and the Bodega Marine Laboratory Program are offered by the entire division.

## The Undergraduate Programs

### Biological Sciences

This major is broad in concept, designed to span the numerous core disciplines of biology. The Biological Sciences major covers most dimensions of the study of life, ranging from molecules and cells to populations of organisms. While emphasizing breadth, the Biological Sciences major also requires the student to select an area of emphasis that provides concentrated attention to one facet of biology at the upper division level. Each area of emphasis coincides with one of the divisional sections.

#### Major:

Biological Sciences, A.B., B.S.

#### Minor:

Biological Sciences

### Evolution and Ecology

The major in evolution and ecology offers the student a broad background in the theoretical and empirical basis of our understanding of 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 allow the student to focus his or her studies.

#### Major:

Evolution and Ecology, A.B., B.S.

### 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 Section of Molecular and Cellular Biology offers three majors. The biochemistry 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 biochemistry 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 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 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.

*Majors:*

Biochemistry, B.S.

Cell Biology, B.S.

Genetics, B.S.

### Neurobiology, Physiology, and Behavior

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 through the actions of the nervous and endocrine systems to 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:*

Neurobiology, Physiology, and Behavior, B.S.

### 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.

*Major:*

Plant Biology, A.B., B.S.

*Minor:*

Plant Biology

### Divisionwide Program

#### Bodega Marine Laboratory Program

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory (BML) located in Bodega Bay, CA. Course offerings include lecture and laboratory instruction in the developmental biology of marine invertebrates, 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). 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.

## College of Engineering

Undergraduate Advising Office

1050 Engineering II

530-752-0557; <http://www.engr.ucdavis.edu>

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.

Fifteen undergraduate engineering curricula, including five formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. Ten programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), the nationally recognized accrediting body for engineering curricula: Aeronautical Science and Engineering, Biological Systems Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Computer Science and Engineering, Electrical Engineering, Electrical Engineering/Materials Science and Engineering, Materials Science and Engineering, and Mechanical Engineering.

The four-year undergraduate program is divided into two parts: the Lower Division Program and the Upper Division Program.

**Lower Division Programs.** If you enter the College of Engineering with fewer than 90 quarter units of credit, follow the lower division program specified for your major. If you enter the College with 90 or more quarter units of credit, you must fulfill the requirements outlined in this chapter under “College of Engineering, Unit Requirements.”

**Upper Division Programs.** If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 90 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

**Minor Programs:** The College of Engineering does not offer minor programs.

### The Undergraduate Programs

#### Biological and Agricultural Engineering

The Department of Biological and Agricultural Engineering offers two majors. 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; and developing systems to protect and preserve our natural resources and environment.

Food engineering majors use engineering science principles in conjunction with biological, chemical, and physical sciences to produce, process, package, store, and distribute food efficiently. Specific objectives include developing and improving processing systems for cooking, freezing, drying, baking, canning, frying and extruding; designing equipment and systems that eliminate microbial and chemical hazards, reduce nutrient losses, and otherwise improve nutrition and diets; and minimizing waste discharge to the environment.

*Majors:*

Biological Systems Engineering, B.S.

Food Engineering, B.S.

### **Chemical Engineering and Materials Science**

The Department of Chemical Engineering and Materials Science offers four majors, including two approved double 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.

Chemical/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 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:*

Chemical Engineering, B.S.

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

Chemical/Biochemical Engineering, B.S.

Materials Science and 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 drinking 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 and Environmental Engineering, B.S.

Civil Engineering/Materials Science and Engineering, B.S.

### **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.

Electrical Engineering/Materials Science and Engineering, B.S.

### **Mechanical and Aeronautical Science Engineering**

Aeronautical 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:*  
Aeronautical 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-lsdo.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.

Most of 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. A set of majors in the basic biological sciences are offered through both the College of Letters and Science and the College of Agricultural and Environmental Sciences and are administered by the Division of Biological Sciences. Refer to the earlier section, "Division of Biological Sciences," for more information.

#### 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.  
Chicana/Chicano (Mexican-American) Studies, A.B.  
Chinese, A.B.  
Classical Civilization, A.B.  
Comparative Literature, A.B.  
Dramatic Art, A.B.  
East Asian Studies, A.B.  
English, A.B.  
French, A.B.  
German, A.B.  
Italian, A.B.  
Japanese, A.B.  
Medieval Studies, A.B.  
Music, A.B.  
Native American Studies, A.B.  
Nature and Culture, A.B.  
Religious Studies, A.B.  
Russian, A.B.  
Spanish, A.B.  
Women's Studies, A.B.

*Minors:*  
African American and African Studies  
American Studies  
Art History  
Art Studio  
Asian American Studies  
Chicana/Chicano (Mexican-American) Studies  
Chinese  
Classical Civilization  
Comparative Literature  
Dramatic Art  
East Asian Studies  
English  
Film Studies  
French  
German  
Greek  
Italian  
Japanese  
Jewish Studies  
Latin  
Medieval Studies  
Music  
Native American Studies  
Nature and Culture  
Religious Studies  
Russian  
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 seven different majors. The division strongly encourages undergraduates to enroll in undergraduate research projects with one-on-one instruction by faculty scholar/researchers.

*Majors:*  
Applied Physics, B.S.  
Chemistry, A.B., B.S.  
Computer Science, B.S.  
Geology, A.B., B.S.  
Mathematics, A.B., B.S.  
Physics, A.B., B.S.  
Statistics, A.B., B.S.

*Minors:*  
Computer Science  
Environmental Geology  
Geology  
Geophysics  
Mathematics  
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.  
 Economics, A.B.  
 Exercise Science, A.B., B.S.  
 History, A.B.  
 International Relations, A.B.  
 Linguistics, A.B.  
 Philosophy, A.B.  
 Political Science, A.B.  
 Political Science–Public Service, A.B.  
 Psychology, A.B., B.S.  
 Sociology, A.B.  
 Sociology–Organizational Studies, A.B.

### Minors:

Anthropology  
 Communication  
 Economics  
 Economy, Justice and Society  
 Education  
 Exercise Science  
 History  
 History and Philosophy of Science  
 Linguistics  
 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 box on next page.) The four groups are:

- University requirements, which apply to all colleges;
- General Education requirement, which applies to all colleges;
- College requirements; and
- Major requirements.

Detailed information on university requirements, the General Education requirement and college requirements can be found in this chapter.

**Every student is responsible for seeing that all his or her degree requirements are fulfilled.**

## UNIVERSITY REQUIREMENTS

All students must fulfill the following University of California requirements.

### Subject A: English Requirement

The university requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Subject A 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 achieving a score of 660 or higher on the SAT II-Writing Test.
- By achieving a grade of 5, 4, or 3 on the College Board Advanced Placement Examination in English.
- 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 better.
- By writing a passing essay on the Subject A 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 Subject A requirement must take this examination. An out-of-state student or any California freshman admitted after mid-April will take another form of the Subject A Examination, which will be offered on the UC Davis campus during the orientation period each quarter. For the time and location consult the *Class Schedule and Room Directory*, 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 English 57 during your first quarter of residence at the university, or as soon thereafter as space is available in the course.* English 57, offered by Sacramento City College on the Davis campus, counts as 4.5 units on your study list and toward minimum progress but is not transferable as units toward graduation. To satisfy the requirement, students must pass the Subject A Examination offered as the final examination for English 57. Students failing the examination must repeat English 57. If the require-

## Bachelor's Degree Requirements

### University Requirements

All students must fulfill the following University of California requirements:

Subject A  
American History and Institutions  
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

Unit  
Residence  
Scholarship  
English Composition

#### College of Engineering

Unit  
Residence  
Scholarship  
English Composition  
Design

#### College of Letters and Science

Unit  
Residence  
Scholarship  
English Composition  
Area (Breadth)  
Foreign Language (A.B. and B.A.S. degrees)

### Major Requirements

Course requirements for each major are listed in the Programs and Courses section of this catalog.

ment has not been satisfied by the end of your third quarter, a hold will be placed on your registration.

Students whose native and 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 non-native speakers of English program and the Subject A program. The results of the Subject A Examination and a special examination in English administered during the orientation period each quarter determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.

#### 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:

- By offering 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.
- By completing 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 offer one of the above courses are subject to the rules for prerequisites and majors.)

- By presenting evidence that the requirement has been accepted as satisfied at another campus of the university.
- By presenting 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.
- By successful completion of the Advanced Placement Examination in American History.

International students, regardless of the type of visa they hold, must meet the university's American History and Institutions requirement for graduation.

#### Unit Requirement

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 and Outreach Services. 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 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.

University 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 2.0 GPA) for all courses you have attempted in the university. An exception to this rule is made for those students undertaking certain honors courses. Grades earned in University Extension courses are not used in calculating individual grade point averages. 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 dif-

ferent 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 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—particular differences of gender, race, ethnicity, sexuality, religion or social class.

### Writing Experience

A GE course in *writing experience* normally requires a minimum of five pages of writing in a block, which will be evaluated for content, 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 on the following page. 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.

- **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.

**Topical Breadth: Assigned Subject Areas for Majors and Minors****Arts and Humanities****Majors**

African American and African Studies  
 American Studies  
 Art History  
 Art Studio  
 Chicana/Chicano (Mexican-American)  
 Studies (Humanities emphasis)  
 Chinese  
 Classical Civilization  
 Comparative Literature  
 Design  
 Dramatic Art  
 English  
 French  
 German  
 Greek  
 History  
 Italian  
 Japanese  
 Landscape Architecture  
 Latin  
 Medieval Studies  
 Music  
 Native American Studies  
 Philosophy  
 Religious Studies  
 Russian  
 Spanish  
 Women's Studies

**Minors**

African American and African Studies  
 American Studies  
 Art History  
 Art Studio  
 Asian American Studies  
 Chicana/Chicano (Mexican-American)  
 Studies  
 Chinese  
 Classical Civilization  
 Comparative Literature  
 Dramatic Art  
 English  
 Film Studies  
 French  
 German  
 Greek  
 History  
 Italian  
 Japanese  
 Jewish Studies  
 Latin  
 Medieval Studies  
 Music  
 Native American Studies  
 Philosophy  
 Religious Studies  
 Russian  
 Social and Ethnic Relations  
 Spanish  
 Women's Studies

**Science and Engineering****Majors**

Agricultural Systems and Environment  
 Animal Biology  
 Animal Science  
 Animal Science and Management  
 Anthropology (B.S. degree only)  
 Applied Physics  
 Atmospheric Science  
 Avian Sciences  
 Biochemistry  
 Biological Sciences  
 Biotechnology  
 Cell Biology  
 Chemistry  
 Community Nutrition  
 Computer Science  
 Crop Science and Management  
 Dietetics  
 Engineering (all majors)  
 Entomology  
 Environmental and Resource Sciences  
 Environmental Biology and  
 Management  
 Environmental Horticulture and  
 Urban Forestry  
 Environmental Toxicology  
 Evolution and Ecology  
 Exercise Science  
 Fermentation Science  
 Fiber and Polymer Science  
 Food Biochemistry  
 Food Science  
 Genetics  
 Geology  
 Hydrology  
 Mathematics  
 Microbiology  
 Nature and Culture  
 Neurobiology, Physiology, and Behavior  
 Nutrition Science  
 Physics  
 Plant Biology  
 Psychology (B.S. degree)  
 Range and Wildlands Science  
 Soil and Water Science  
 Statistics  
 Viticulture and Enology  
 Wildlife, Fish and Conservation  
 Biology

**Minors**

Agricultural Computing and  
 Information Systems  
 Agricultural Entomology  
 Agricultural Systems and Environment  
 Animal Science  
 Anthropology (Biological Emphasis)  
 Apiculture  
 Applied Biological Systems Technology  
 Atmospheric Science  
 Avian Sciences  
 Biological Sciences  
 Community Nutrition  
 Computer Science  
 Entomology  
 Environmental Geology  
 Environmental Horticulture  
 Environmental Toxicology

Exercise Science  
 Fiber and Polymer Science  
 Geographic Information Systems  
 Geographic Studies  
 Geology  
 Geophysics  
 Hydrology  
 Insect Ecology  
 Mathematics  
 Medical-Veterinary Entomology  
 Nature and Culture  
 Nematology  
 Nutrition and Food  
 Nutrition Science  
 Physics  
 Plant Biology  
 Precision Agriculture  
 Science and Society  
 Soil Science  
 Statistics

**Social Sciences****Majors**

Agricultural and Managerial Economics  
 Anthropology (A.B. degree)  
 Chicana/Chicano (Mexican-American)  
 Studies (Social Sciences emphasis)  
 Communication  
 Community and Regional Development  
 East Asian Studies  
 Economics  
 Environmental Policy Analysis and  
 Planning  
 Human Development  
 International Agricultural Development  
 International Relations  
 Linguistics  
 Political Science  
 Political Science–Public Service  
 Psychology (A.B. degree)  
 Sociology  
 Sociology–Organizational Studies  
 Textiles and Clothing

**Minors**

Aging and Adult Development  
 Agricultural and Managerial Economics  
 Anthropology (Social–Cultural  
 Emphasis)  
 Anthropology (General Emphasis)  
 Communication  
 Community Development  
 East Asian Studies  
 Economics  
 Economy, Justice and Society  
 Education  
 Energy Policy  
 Environmental Policy Analysis  
 History and Philosophy of Science  
 Human Development  
 International Agricultural Development  
 Linguistics  
 Political Science  
 Psychology  
 Science and Society  
 Sociology  
 Textiles and Clothing  
 War–Peace Studies



### Fulfilling the General Education Requirement

Students entering UC Davis during the 1996-97 academic year, and thereafter

#### 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.

- **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 that follows.

#### 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 that follows.

- **Subject A.** You must satisfy the university Subject A 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 Subject A requirement, you will **not** receive GE *writing experience* credit for that course.

#### Additional Conditions

1. **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.

#### 2. 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 1, 3, 18, 19, 101, 102, 104A, 104B, 104C, 104D, 104E, Native American Studies 5.

Remember: You must satisfy the university Subject A requirement **before** you take any *writing experience* course for GE credit.

#### 3. 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.

4. **Approved GE courses.** You cannot claim GE credit for any course you completed before it was an approved GE course.

#### 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).

#### Approved General Education Courses

A list of the courses that provide General Education credit for 1998-99 appears on the following pages. These courses may be used to fulfill the GE Requirement for students entering UC Davis in 1996-97 and thereafter. 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. You should check the *Class Schedule and Room Directory* each quarter for the most current information.

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*Rain or  
shine, stu-  
dents head  
for the  
Coffee House  
for a bagel—  
they consume  
about  
200 dozen  
every day.*

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## 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.

| <b>Arts and Humanities</b>                      |                                    |
|-------------------------------------------------|------------------------------------|
| African American and African Studies 12.....D W | Art History 188A.....D W           |
| African Amer & Afr Std 15.....D W               | Art History 188B.....W             |
| African Amer & Afr Std 16.....D W               | Art History 188C.....W             |
| African Amer & Afr Std 50.....D W               | Art History 188D.....W             |
| African Amer & Afr Std 52.....D W               | Art History 188E.....W             |
| African Amer & Afr Std 100.....D                | Art Studio 10                      |
| African Amer & Afr Std 107A.....D W             | Art Studio 30.....D W              |
| African Amer & Afr Std 107B.....D W             | Art Studio 131.....D W             |
| African Amer & Afr Std 107C.....D W             | Art Studio 132A.....W              |
| African Amer & Afr Std 111.....D W              | Art Studio 132B.....D W            |
| African Amer & Afr Std 123.....D                | Art Studio 147.....W               |
| African Amer & Afr Std 150A.....D               | Art Studio 148.....W               |
| African Amer & Afr Std 150B.....D               | Art Studio 149.....D W             |
| African Amer & Afr Std 152.....D W              | Art Studio 150.....W               |
| African Amer & Afr Std 160.....D                | Chicana/Chicano Studies 111        |
| African Amer & Afr Std 162.....D W              | Chicana/Chicano Std 154.....D      |
| African Amer & Afr Std 163.....D W              | Chinese 10.....D W                 |
| African Amer & Afr Std 170.....D W              | Chinese 11.....D W                 |
| African Amer & Afr Std 171.....D                | Chinese 50.....D W                 |
| American Studies 1A †.....D W                   | Chinese 104.....D W                |
| American Studies 1B †.....D W                   | Chinese 105.....D W                |
| American Studies 1C †.....D W                   | Chinese 106.....D W                |
| American Studies 1E †.....D W                   | Chinese 107.....D W                |
| American Studies 30 †.....D W                   | Chinese 108.....D W                |
| American Studies 110 †.....D W                  | Chinese 109A.....D W               |
| American Studies 120 †.....D W                  | Chinese 109B.....D W               |
| American Studies 130 †.....D W                  | Chinese 109C.....D W               |
| American Studies 132 †.....D W                  | Chinese 109D.....D W               |
| American Studies 151 †.....D W                  | Chinese 109E.....D W               |
| American Studies 152 †.....D W                  | Chinese 109F.....D W               |
| American Studies 153 †.....D W                  | Chinese 109G.....D W               |
| American Studies 154 †.....D W                  | Chinese 109H.....D W               |
| American Studies 155 †.....D W                  | Chinese 109I.....D W               |
| American Studies 156 †.....D W                  | Chinese 110.....D W                |
| Art History 1A                                  | Classics 1.....W                   |
| Art History 1B                                  | Classics 2.....W                   |
| Art History 1C.....D                            | Classics 3.....W                   |
| Art History 1D.....D                            | Classics 10                        |
| Art History 25.....#                            | Classics 15.....D W                |
| Art History 150.....D                           | Classics 20.....W                  |
| Art History 151.....D                           | Classics 50.....W                  |
| Art History 152.....D                           | Classics 102.....W                 |
| Art History 153.....D W                         | Classics 110.....W                 |
| Art History 154A.....W                          | Classics 140.....W                 |
| Art History 154B.....W                          | Classics 141.....W                 |
| Art History 155.....W                           | Classics 142.....W                 |
| Art History 163A.....D W                        | Classics 143.....W                 |
| Art History 163B.....D W                        | Classics 150.....W                 |
| Art History 163C.....D W                        | Classics 171.....D W               |
| Art History 164.....D W                         | Classics 174.....W                 |
| Art History 168.....W                           | Classics 190.....W                 |
| Art History 176A.....W                          | Comparative Literature 1.....*     |
| Art History 176B.....W                          | Comparative Literature 2.....*     |
| Art History 177A.....W                          | Comparative Literature 3.....*     |
| Art History 177B.....W                          | Comparative Literature 4.....D *   |
| Art History 178A.....W                          | Comparative Literature 5.....D W   |
| Art History 178B.....W                          | Comparative Literature 6.....D W   |
| Art History 178C.....W                          | Comparative Literature 7.....D W   |
| Art History 179B.....W                          | Comparative Literature 8.....W     |
| Art History 182.....D W                         | Comparative Literature 9.....D W   |
| Art History 183A.....W                          | Comparative Literature 12.....D W  |
| Art History 183B.....W                          | Comparative Literature 13.....W    |
| Art History 183C.....W                          | Comparative Literature 14.....W    |
| Art History 183E.....D W                        | Comparative Literature 15.....W    |
| Art History 184.....W                           | Comparative Literature 20.....W    |
|                                                 | Comparative Literature 25.....D W  |
|                                                 | Comparative Literature 53A.....D W |
|                                                 | Comparative Literature 53B.....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.....W   |
|                                                 | Comparative Literature 146.....W   |
|                                                 | Comparative Literature 147.....D W |
|                                                 | Comparative Literature 151.....D W |
|                                                 | Comparative Literature 152.....D W |
|                                                 | Comparative Literature 153.....D W |
|                                                 | Comparative Literature 154.....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 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   |
|                                                 | Design 1.....W                     |
|                                                 | Design 100.....W                   |
|                                                 | Design 140.....W                   |
|                                                 | Design 142A.....W                  |
|                                                 | Design 142B.....W                  |
|                                                 | Design 143.....W                   |
|                                                 | Design 144.....W                   |
|                                                 | Dramatic Art 1.....D W             |
|                                                 | Dramatic Art 20                    |
|                                                 | Dramatic Art 150.....D W           |
|                                                 | Dramatic Art 154.....D W           |
|                                                 | Dramatic Art 155.....D W           |
|                                                 | Dramatic Art 156A.....D W          |
|                                                 | Dramatic Art 156B.....D W          |
|                                                 | Dramatic Art 156C.....D W          |
|                                                 | East Asian Studies 113.....D W     |
|                                                 | English 3.....*                    |
|                                                 | English 4.....W                    |
|                                                 | English 30A.....D W                |
|                                                 | English 30B.....D W                |
|                                                 | English 105.....W                  |
|                                                 | English 107.....W                  |
|                                                 | English 118.....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 180.....W                  |
|                                                 | English 182.....D W                |
|                                                 | English 184.....W                  |
|                                                 | French 25.....W                    |
|                                                 | French 50.....W                    |
|                                                 | French 101                         |
|                                                 | French 102                         |
|                                                 | French 103                         |
|                                                 | French 107N                        |
|                                                 | French 108                         |
|                                                 | French 112.....W                   |
|                                                 | French 113.....W                   |
|                                                 | French 114.....W                   |
|                                                 | French 115                         |
|                                                 | French 116                         |
|                                                 | French 117A                        |
|                                                 | French 117B                        |
|                                                 | French 118A                        |
|                                                 | French 118B                        |
|                                                 | French 119A                        |
|                                                 | French 119B                        |
|                                                 | French 119C                        |
|                                                 | French 120                         |
|                                                 | French 121                         |
|                                                 | French 124.....D                   |
|                                                 | French 125                         |
|                                                 | French 127                         |
|                                                 | French 130                         |
|                                                 | French 133.....D                   |
|                                                 | French 162                         |
|                                                 | German 47.....D W                  |
|                                                 | German 48.....W                    |
|                                                 | German 101A                        |
|                                                 | German 101B                        |
|                                                 | German 111A.....W                  |
|                                                 | German 111B.....W                  |
|                                                 | German 111C.....W                  |
|                                                 | German 111D.....W                  |
|                                                 | German 111E.....W                  |
|                                                 | German 111G.....W                  |
|                                                 | German 111H.....W                  |
|                                                 | German 112A.....D W                |
|                                                 | German 113.....W                   |
|                                                 | German 114.....W                   |
|                                                 | German 115A.....W                  |
|                                                 | German 117A.....W                  |
|                                                 | German 117B.....W                  |
|                                                 | German 117C.....W                  |
|                                                 | German 118A.....W                  |
|                                                 | German 118B.....W                  |
|                                                 | German 118C.....W                  |
|                                                 | German 118E.....W                  |
|                                                 | German 118F.....W                  |
|                                                 | German 119.....W                   |
|                                                 | German 130.....W                   |
|                                                 | German 140.....W                   |
|                                                 | German 141.....D W                 |
|                                                 | Greek 100.....W                    |
|                                                 | Greek 101.....W                    |
|                                                 | Greek 102.....W                    |
|                                                 | Greek 103A.....W                   |
|                                                 | Greek 103B.....W                   |
|                                                 | Greek 104.....W                    |
|                                                 | Greek 105.....W                    |
|                                                 | Greek 111.....W                    |
|                                                 | Greek 112.....W                    |
|                                                 | Greek 113.....W                    |
|                                                 | Greek 114.....W                    |
|                                                 | Greek 115.....W                    |
|                                                 | Greek 116.....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).

## GENERAL EDUCATION COURSES

|                         |                               |                                     |                                |
|-------------------------|-------------------------------|-------------------------------------|--------------------------------|
| Hebrew 101 .....W       | History 166B                  | Italian 114                         | Nature and Culture 120 .....W  |
| Hebrew 102 .....W       | History 168                   | Italian 115A                        | Philosophy 1 .....W            |
| History 3               | History 169A .....D W         | Italian 115B                        | Philosophy 6 .....W            |
| History 4A .....W       | History 169B .....D W         | Italian 115C                        | Philosophy 11 .....D W         |
| History 4B .....W       | History 170A .....D W         | Italian 115D                        | Philosophy 13 .....W           |
| History 4C .....W       | History 170B .....D W         | Italian 118                         | Philosophy 14 .....D W         |
| History 8 .....D        | History 170C                  | Italian 119                         | Philosophy 15 .....W           |
| History 9A .....D W     | History 171A .....D W         | Italian 120A                        | Philosophy 21 .....W           |
| History 9B .....D W     | History 171B                  | Italian 120B                        | Philosophy 22 .....W           |
| History 10C .....W      | History 173 .....D W          | Italian 131                         | Philosophy 23 .....W           |
| History 15 .....D W     | History 174A .....D W         | Italian 139B                        | Philosophy 24 .....W           |
| History 17A .....D W    | History 174B .....W           | Italian 140 .....W                  | Philosophy 31 †                |
| History 17B .....D W    | History 174C .....W           | Italian 141 .....D W                | Philosophy 32 † .....W         |
| History 30              | History 174D                  | Italian 142 .....W                  | Philosophy 101 .....W          |
| History 72A .....D W    | History 176A                  | Italian 150 .....D W                | Philosophy 102 .....W          |
| History 72B .....D W    | History 176B                  | Japanese 10 .....D W                | Philosophy 103 .....W          |
| History 85              | History 177A .....D W         | Japanese 15 .....D W                | Philosophy 104 † .....W        |
| History 110             | History 177B .....D W         | Japanese 50 .....D W                | Philosophy 105 .....W          |
| History 111A .....W     | History 178 .....D W          | Japanese 101 .....D W               | Philosophy 106 † .....W        |
| History 111B .....W     | History 180A                  | Japanese 102 .....D W               | Philosophy 107 † .....W        |
| History 111C .....W     | History 180B                  | Japanese 103 .....D W               | Philosophy 108 † .....W        |
| History 112A .....D W   | History 180C                  | Japanese 104 .....D W               | Philosophy 109 † .....W        |
| History 112B .....D W   | History 183A .....D W         | Japanese 105 .....D W               | Philosophy 110 † .....W        |
| History 115A .....D W   | History 183B .....D W         | Japanese 106 .....D W               | Philosophy 114 .....W          |
| History 115B .....D W   | History 185A .....W           | Japanese 107 .....D W               | Philosophy 115 .....W          |
| History 115C .....D W   | History 185B .....W           | Japanese 108 .....D W               | Philosophy 123 .....W          |
| History 116             | History 189A                  | Landscape Architecture 30 .....W    | Philosophy 127 † .....W        |
| History 121A .....W     | History 189B                  | Landscape Architecture 40 † .....W  | Philosophy 143 .....W          |
| History 121B .....W     | History 189C .....W           | Landscape Architecture 168 † .....W | Philosophy 145 .....W          |
| History 121C .....W     | History 191A .....D W         | Latin 100 .....W                    | Philosophy 151 .....W          |
| History 122             | History 191B .....D W         | Latin 101 .....W                    | Religious Studies 1 .....D W   |
| History 125 .....W      | History 191C .....D W         | Latin 102 .....W                    | Religious Studies 2 .....D W   |
| History 130A .....D W   | History 191D .....D W         | Latin 103 .....W                    | Religious Studies 3A .....D W  |
| History 130B            | History 191E .....D W         | Latin 104 .....W                    | Religious Studies 3B .....D W  |
| History 130C            | History 191F .....D W         | Latin 105 .....W                    | Religious Studies 3C .....D W  |
| History 131A            | History 194A .....D W         | Latin 106 .....W                    | Religious Studies 21 .....D W  |
| History 131B .....W     | History 194B .....D           | Latin 108 .....W                    | Religious Studies 23 .....D W  |
| History 131C .....W     | History 194C .....D           | Latin 109 .....W                    | Religious Studies 40 .....W    |
| History 133             | History 194D                  | Latin 110 .....W                    | Religious Studies 115 .....D W |
| History 134A            | History 194E                  | Latin 111 .....W                    | Religious Studies 141A .....W  |
| History 135A            | History 196A .....D W         | Latin 112 .....W                    | Religious Studies 141B .....W  |
| History 135B            | History and Philosophy        | Latin 114 .....W                    | Religious Studies 141C .....W  |
| History 136 .....W      | of Science 130A † .....W      | Latin 115 .....W                    | Religious Studies 142 .....W   |
| History 138A .....W     | History and Philosophy        | Latin 116 .....W                    | Russian 41 .....W              |
| History 138B .....W     | of Science 130B † .....W      | Latin 125 .....W                    | Russian 42 .....W              |
| History 138C .....W     | History and Philosophy        | Linguistics 1 † .....W              | Russian 44 .....D W            |
| History 139A † .....W   | of Science 131 † .....W       | Linguistics 50 † .....W             | Russian 102                    |
| History 139B † .....W   | Humanities 2 .....W           | Medieval Studies 20A .....W         | Russian 121                    |
| History 141 .....W      | Humanities 5 † .....W         | Medieval Studies 20B .....W         | Russian 123 .....W             |
| History 142 .....D      | Humanities 6 † .....W         | Medieval Studies 20C .....W         | Russian 126 .....W             |
| History 143 .....D W    | Humanities 8 † .....D W       | Medieval Studies 120A .....W        | Russian 127                    |
| History 144 .....D W    | Humanities 9 (course 9D       | Medieval Studies 120D .....W        | Russian 128                    |
| History 145 .....W      | required concurrently) .....# | Medieval Studies 120E .....W        | Russian 129 .....D W           |
| History 146A .....W     | Humanities 10 .....D W        | Medieval Studies 130A .....W        | Russian 130 .....W             |
| History 146B .....W     | Humanities 11 .....W          | Medieval Studies 130B .....W        | Russian 131 .....W             |
| History 147A † .....W   | Humanities 12 .....W          | Music 10 .....W                     | Russian 132 .....W             |
| History 147B † .....W   | Humanities 20A .....W         | Music 105 .....D W                  | Russian 139 .....D W           |
| History 147C † .....D W | Humanities 60 † .....D W      | Music 106 .....W                    | Russian 140 .....D W           |
| History 148A .....D W   | Humanities 118 .....D W       | Music 110A .....W                   | Russian 141 .....D W           |
| History 148B .....D W   | Humanities 119 .....D W       | Music 110B .....W                   | Russian 142 .....D W           |
| History 148C .....D W   | Humanities 120 .....D W       | Music 110C .....W                   | Russian 143 .....D W           |
| History 149 † .....D W  | Humanities 122 .....D W       | Music 110D .....W                   | Russian 150 .....D W           |
| History 151A .....W     | Humanities 124 .....W         | Music 110E .....W                   | Russian 151 .....W             |
| History 151B .....W     | Humanities 125 .....W         | Music 110F .....W                   | Russian 154 .....D W           |
| History 151C .....W     | Humanities 176 .....W         | Native American Studies 5 .....D *  | Russian 159 .....D             |
| History 151D .....D W   | Humanities 177 .....W         | Native American Std 10 † .....D W   | Russian 166 .....D W           |
| History 161A .....D W   | Humanities 180 .....W         | Native American Std 33 .....D       | Spanish 139 .....D             |
| History 161B .....D W   | Integrated Studies 8B .....W  | Native American Std 101 .....D      | Spanish 141 .....D             |
| History 162 .....D W    | Italian 50 .....W             | Native American Std 156 .....D W    | Spanish 148 .....D W           |
| History 163A            | Italian 105                   | Native American Std 181A .....D W   | Spanish 149 .....D W           |
| History 163B            | Italian 107                   | Native American Std 181B .....D W   | Spanish 170 .....D W           |
| History 164             | Italian 108 .....D W          | Native American Std 181C .....D W   | Spanish 172 .....D             |
| History 165             | Italian 112                   | Native American Studies 191 .....D  | Spanish 174 .....D             |
| History 166A            | Italian 113                   | Nature and Culture 1 † .....W       | Spanish 176 .....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).

## GENERAL EDUCATION COURSES

|                                                    |                                                           |                                                    |                                                        |
|----------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------|
| Women's Studies 20 .....D W                        | Engineering: Computer<br>Science 167 .....W               | Geology 135                                        | Science and Society 20 † .....W                        |
| Women's Studies 50 † .....D W                      | Entomology 10                                             | Geology 138                                        | Science and Society 105 .....W                         |
| Women's Studies 60 † .....D                        | Entomology 17 .....W                                      | Geology 143 .....W                                 | Science and Society 120 † .....W                       |
| Women's Studies 70 † .....D                        | Entomology 100 .....#                                     | Geology 144N .....W                                | Soil Science 10 .....W                                 |
| Women's Studies 130 † .....D                       | Entomology 101                                            | Geology 145N .....W                                | Statistics 10 † .....W                                 |
| Women's Studies 158 † .....D                       | Entomology 102                                            | History and Philosophy<br>of Science 130A † .....W | Statistics 12                                          |
| Women's Studies 160 .....D                         | Entomology 103 .....W                                     | History and Philosophy<br>of Science 130B † .....W | Statistics 13                                          |
| Women's Studies 162 .....D                         | Entomology 104                                            | History and Philosophy<br>of Science 131 † .....W  | Statistics 32                                          |
| Women's Studies 164 .....D                         | Entomology 107 .....W                                     | Human Development 19 .....W                        | Statistics 100                                         |
| Women's Studies 180 .....D                         | Entomology 109 .....W                                     | Integrated Studies 8A .....W                       | Statistics 102                                         |
| Women's Studies 195 † .....D                       | Entomology 110 .....W                                     | Linguistics 175                                    | Statistics 103                                         |
|                                                    | Entomology 111 .....W                                     | Mathematics 16A                                    | Statistics 104                                         |
|                                                    | Entomology 116                                            | Mathematics 16B                                    | Statistics 106                                         |
|                                                    | Entomology 119 .....W                                     | Mathematics 16C                                    | Statistics 108                                         |
|                                                    | Entomology 147 .....W                                     | Mathematics 21A                                    | Statistics 120                                         |
|                                                    | Entomology 153 .....W                                     | Mathematics 21AH                                   | Statistics 138                                         |
|                                                    | Entomology 156 .....#                                     | Mathematics 21B                                    | Statistics 144                                         |
|                                                    | Environmental Horticulture 1 .....W                       | Mathematics 21BH                                   | Textiles and Clothing 6                                |
|                                                    | Environmental and Resource<br>Sciences 60 .....W          | Mathematics 21C                                    | Textiles and Clothing 162                              |
|                                                    | Environ & Resource Sci 100 .....#                         | Mathematics 21CH                                   | Viticulture and Enology 3 † .....#                     |
|                                                    | Environ & Resource Sci 121 .....W                         | Mathematics 21M                                    | Wildlife, Fish and<br>Conservation Biology 10 .....D W |
|                                                    | Environ & Resource Sci 131 .....W                         | Mathematics 36                                     | Wildlife, Fish and Conserv                             |
|                                                    | Environmental Science<br>and Policy 10 .....W             | Mathematics 63                                     | Biology 102L .....W                                    |
|                                                    | Environ Science & Policy 30 .....#                        | Med-Cell Biology and Human<br>Anatomy 101 .....#   | Wildlife, Fish and<br>Conservation Biology 121 .....W  |
|                                                    | Environ Science & Policy 116 .....#                       | Microbiology 10 .....W                             | Wildlife, Fish and Conservation                        |
|                                                    | Environ Science & Policy 121 .....W                       | Microbiology 20 .....W                             | Biology 140 .....W                                     |
|                                                    | Environmental Toxicology 10                               | Molecular & Cellular Biol 10 .....W                | Wildlife, Fish and Conservation                        |
|                                                    | Environmental Toxicol 112A                                | Molecular & Cellular Biol 162 .....W               | Biology 141 .....W                                     |
|                                                    | Environmental Toxicol 112B                                | Nature and Culture 1 † .....W                      | Wildlife, Fish and Conservation                        |
|                                                    | Environmental Toxicol 114A                                | Nematology 110                                     | Biology 153 .....W                                     |
|                                                    | Environmental Toxicol 114B                                | Neurobiology, Physiology and<br>Behavior 10        | Wildlife, Fish and Conservation                        |
|                                                    | Environmental Toxicol 128                                 | Neurobiology, Physiology and<br>Behavior 12 .....# | Biology 156 .....W                                     |
|                                                    | Environmental Toxicol 131                                 | Nutrition 10                                       |                                                        |
|                                                    | Environmental Toxicol 135                                 | Nutrition 11 .....W                                | <b>Social Sciences</b>                                 |
|                                                    | Environmental Toxicol 146                                 | Nutrition 20 †                                     | African Amer & Afr Std 80 .....D W                     |
|                                                    | Evolution and Ecology 108                                 | Nutrition 114 .....W                               | African Amer & Afr Std 110 .....D                      |
|                                                    | Evolution and Ecology 121 .....W                          | Nutrition 115 .....W                               | African Amer & Afr Std 133 .....D                      |
|                                                    | Evolution and Ecology 138 .....W                          | Nutrition 120A † .....D                            | African Amer & Afr Std 145A...D                        |
|                                                    | Exercise Science 101                                      | Nutrition 120B † .....D                            | African Amer & Afr Std 145B...D                        |
|                                                    | Exercise Science 103                                      | Nutrition 123 .....W                               | Agricultural and Resource                              |
|                                                    | Exercise Science 110 .....W                               | Philosophy 31 †                                    | Economics 1                                            |
|                                                    | Exercise Science 113                                      | Philosophy 32 † .....W                             | Agricultural and Resource                              |
|                                                    | Exercise Science 115                                      | Philosophy 104 † .....W                            | Economics 15 .....D W                                  |
|                                                    | Exercise Science 117                                      | Philosophy 106 † .....W                            | Agric & Resource Econ 115A...D                         |
|                                                    | Exercise Science 118 .....W                               | Philosophy 107 † .....W                            | Agric & Resource Econ 115B                             |
|                                                    | Exercise Science 126                                      | Philosophy 108 † .....W                            | Agric & Resource Econ 120                              |
|                                                    | Fiber and Polymer<br>Science 110 † .....W                 | Philosophy 110 † .....W                            | Agric & Resource Econ 146                              |
|                                                    | Food Science & Technol 2 †                                | Physics 10                                         | Agric & Resource Econ 147                              |
|                                                    | Food Science & Technol 120                                | Physics 137 †                                      | Agric & Resource Econ 150 .....D W                     |
|                                                    | Food Science & Technol 128                                | Physics 160 †                                      | Agric & Resource Econ 175                              |
|                                                    | Geology 1                                                 | Plant Biology 11 .....W                            | Agric & Resource Econ 176                              |
|                                                    | Geology 3 .....#                                          | Plant Biology 12 .....D W                          | Agricultural Education 100 .....W                      |
|                                                    | Geology 4                                                 | Plant Biology 108                                  | Agricultural Education 160 .....W                      |
|                                                    | Geology 10                                                | Plant Biology 112                                  | Agricultural Education 172 .....W                      |
|                                                    | Geology 32 .....W                                         | Plant Biology 116                                  | American Studies 1A † .....D W                         |
|                                                    | Geology 36 .....W                                         | Plant Biology 141 † .....W                         | American Studies 1B † .....D W                         |
|                                                    | Geology 43 .....W                                         | Plant Biology 142                                  | American Studies 1C † .....D W                         |
|                                                    | Geology 100 .....W                                        | Plant Biology 143 .....W                           | American Studies 1E † .....D W                         |
|                                                    | Geology 101 .....W                                        | Plant Biology 151 .....W                           | American Studies 30 † .....D W                         |
|                                                    | Geology 105N .....W                                       | Plant Pathology 140 .....W                         | American Studies 110 † .....D W                        |
|                                                    | Geology 106N .....W                                       | Pomology 10 .....W                                 | American Studies 120 † .....D W                        |
|                                                    | Geology 108N .....W                                       | Science & Technology Std 1 †                       | American Studies 130 † .....D W                        |
|                                                    | Geology 109 (course 109L required<br>concurrently) .....# | Science & Technol Std 20 † .....W                  | American Studies 132 † .....D W                        |
|                                                    | Geology 110 .....W                                        | Science and Society 1 † .....D W                   | American Studies 133 .....D W                          |
|                                                    | Geology 115N † .....W                                     | Science and Society 2 † .....W                     | American Studies 139 .....D W                          |
|                                                    | Geology 116 .....#                                        | Science and Society 3 † .....W                     | American Studies 151 † .....D W                        |
|                                                    | Geology 134 .....W                                        | Science and Society 5 † .....W                     | American Studies 152 † .....D W                        |
|                                                    | Geology 135 .....#                                        | Science and Society 15 † .....D W                  | American Studies 153 † .....D W                        |
|                                                    |                                                           |                                                    | American Studies 154 † .....D W                        |
| Agricultural Systems and<br>Environment 7 .....W   |                                                           |                                                    |                                                        |
| Agricultural Systems and<br>Environment 120        |                                                           |                                                    |                                                        |
| Agricultural Systems and<br>Environment 121 .....W |                                                           |                                                    |                                                        |
| Agricultural Systems and<br>Environment 130 .....W |                                                           |                                                    |                                                        |
| 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 146 .....W                          |                                                           |                                                    |                                                        |
| Anthropology 1 .....D W                            |                                                           |                                                    |                                                        |
| Anthropology 5 .....W                              |                                                           |                                                    |                                                        |
| Anthropology 15 .....D W                           |                                                           |                                                    |                                                        |
| Anthropology 151 .....W                            |                                                           |                                                    |                                                        |
| Anthropology 152 .....W                            |                                                           |                                                    |                                                        |
| Anthropology 153 .....W                            |                                                           |                                                    |                                                        |
| Anthropology 154A .....W                           |                                                           |                                                    |                                                        |
| Anthropology 154B .....W                           |                                                           |                                                    |                                                        |
| Anthropology 155 .....W                            |                                                           |                                                    |                                                        |
| Anthropology 156                                   |                                                           |                                                    |                                                        |
| Anthropology 157 .....#                            |                                                           |                                                    |                                                        |
| Anthropology 158 .....D W                          |                                                           |                                                    |                                                        |
| Anthropology 181                                   |                                                           |                                                    |                                                        |
| Anthropology 183 .....W                            |                                                           |                                                    |                                                        |
| Astronomy 10                                       |                                                           |                                                    |                                                        |
| Atmospheric Science 5 .....W                       |                                                           |                                                    |                                                        |
| Atmospheric Science 10 .....W                      |                                                           |                                                    |                                                        |
| Avian Sciences 11 .....W                           |                                                           |                                                    |                                                        |
| Avian Sciences 13 .....W                           |                                                           |                                                    |                                                        |
| Biological Sciences 1C .....W                      |                                                           |                                                    |                                                        |
| Biological Sciences 10 .....W                      |                                                           |                                                    |                                                        |
| Chemistry 2A                                       |                                                           |                                                    |                                                        |
| Chemistry 2B                                       |                                                           |                                                    |                                                        |
| Chemistry 2C                                       |                                                           |                                                    |                                                        |
| Chemistry 10 .....W                                |                                                           |                                                    |                                                        |
| Chemistry 111 .....W                               |                                                           |                                                    |                                                        |
| Chemistry 115 .....W                               |                                                           |                                                    |                                                        |
| Chemistry 150 .....W                               |                                                           |                                                    |                                                        |
| Engineering 160 †                                  |                                                           |                                                    |                                                        |
| Engineering: Applied<br>Science-Davis 137 †        |                                                           |                                                    |                                                        |
| Engineering: Biological<br>Systems 75              |                                                           |                                                    |                                                        |
| Engineering: Civil and<br>Environmental 3          |                                                           |                                                    |                                                        |
| Engineering: Computer<br>Science 15 .....W         |                                                           |                                                    |                                                        |
| Engineering: Computer<br>Science 15AT .....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).



## GENERAL EDUCATION COURSES

|                                   |                                     |                                     |                                    |
|-----------------------------------|-------------------------------------|-------------------------------------|------------------------------------|
| American Studies 155 † .....D W   | Communication 115                   | Humanities 123                      | Political Science 142.....D        |
| American Studies 156 † .....D W   | Communication 130                   | Integrated Studies 8C.....W         | Political Science 151.....D W      |
| Animal Science 141 .....W         | Communication 134                   | International Agricultural          | Political Science 152.....D W      |
| Animal Science 148 .....W         | Communication 135 .....D            | Development 10 .....D W             | Political Science 155.....W        |
| Anthropology 2 .....D W           | Communication 136                   | International Agricultural Dev      | Political Science 160.....W        |
| Anthropology 3 .....D             | Communication 138                   | elopment 103.....D                  | Political Science 162.....W        |
| Anthropology 4 .....D W           | Communication 140                   | Landscape Architecture 2.....W      | Political Science 163.....W        |
| Anthropology 20 .....D            | Communication 141                   | Landscape Architecture 40 † .....W  | Political Science 164.....W        |
| Anthropology 21 .....D W          | Communication 143                   | Landscape Architecture 168 † .....W | Political Science 165.....W        |
| Anthropology 23 .....D W          | Communication 145                   | Linguistics 1 † .....W              | Political Science 166.....D        |
| Anthropology 101                  | Communication 152                   | Linguistics 50 † .....W             | Political Science 168.....D        |
| Anthropology 110                  | Community and Regional              | Linguistics 163 .....D W            | Political Science 169.....D W      |
| Anthropology 112                  | Development 1 .....D W              | Linguistics 171                     | Political Science 174.....W        |
| Anthropology 113 .....D           | Community & Region Dev 2 .....D W   | Linguistics 173                     | Political Science 175.....W        |
| Anthropology 117 .....D W         | Community & Reg Dev 118 .....W      | Native American Studies 1 .....D    | Political Science 176.....D        |
| Anthropology 119                  | Community & Reg Dev 140 .....W      | Native American Std 10 † .....D W   | Political Science 180.....W        |
| Anthropology 120 .....D W         | Community & Reg Dev 151 .....D W    | Native American Std 46 .....D W     | Political Science 181.....W        |
| Anthropology 121N                 | Community & Reg Dev 152 .....W      | Native American Std 55 .....D W     | Political Science 182.....W        |
| Anthropology 122 .....D W         | Community & Reg Dev 154 .....D W    | Native American Std 115 .....D W    | Political Science 187.....W        |
| Anthropology 123A.....D W         | Community & Reg Dev 157 .....D W    | Native American Std 116 .....D      | Political Science 192A.....W       |
| Anthropology 123B.....D W         | Community & Reg Dev 176 .....D W    | Native American Std 117 .....D      | Political Science 192B.....W       |
| Anthropology 124 .....D W         | Consumer Sciences 100 .....D W      | Native American Std 118 .....D      | Psychology 1                       |
| Anthropology 125A.....D           | Economics 1A                        | Native American Std 120 .....D W    | Psychology 114 .....D W            |
| Anthropology 125B.....D W         | Economics 1B                        | Native American Std 122 .....D W    | Psychology 120 .....W              |
| Anthropology 126 .....D W         | Economics 104                       | Native American Std 130A.....D W    | Psychology 144                     |
| Anthropology 127 .....D W         | Economics 105                       | Native American Std 130B.....D W    | Psychology 147 .....W              |
| Anthropology 128 .....D W         | Economics 110A .....D               | Native American Std 130C.....D W    | Psychology 168                     |
| Anthropology 129 .....D W         | Economics 110B                      | Native American Std 133 .....D      | Psychology 175 .....W              |
| Anthropology 130 .....D W         | Economics 111A                      | Native American Std 134 .....D W    | Psychology 177 .....W              |
| Anthropology 131 .....D W         | Economics 111B                      | Native American Std 180 .....D W    | Science & Technol Std 1 †          |
| Anthropology 132N .....W          | Economics 115A .....D               | Nature and Culture 100 .....D W     | Science & Technol Std 20 † .....W  |
| Anthropology 133 .....D W         | Economics 115B                      | Nutrition 20 †                      | Science and Society 1 † .....D W   |
| Anthropology 134N .....D          | Economics 116                       | Nutrition 120A † .....D             | Science and Society 2 † .....W     |
| Anthropology 135 .....D W         | Economics 121A                      | Nutrition 120B † .....D             | Science and Society 3 † .....W     |
| Anthropology 136 .....W           | Economics 121B                      | Philosophy 109 † .....W             | Science and Society 5 † .....W     |
| Anthropology 137                  | Economics 162                       | Philosophy 118.....D W              | Science and Society 15 † .....D W  |
| Anthropology 138                  | Education 110 .....W                | Philosophy 119.....D W              | Science and Society 20 † .....W    |
| Anthropology 139 .....D W         | Education 120 .....W                | Philosophy 127 † .....W             | Science and Society 120 † .....W   |
| Anthropology 140A.....D W         | Engineering 160 †                   | Physics 137 †                       | Sociology 1                        |
| Anthropology 140B.....D W         | Engineering: Applied                | Physics 160 †                       | Sociology 2 .....W                 |
| Anthropology 141A.....D W         | Science-Davis 137 †                 | Plant Biology 141 † .....W          | Sociology 3 .....W                 |
| Anthropology 141B.....D W         | Engineering: Civil and              | Political Science 1.....W           | Sociology 4 .....D W               |
| Anthropology 142 .....D W         | Environmental 160.....W             | Political Science 2.....W           | Sociology 5 .....D W               |
| Anthropology 143A.....D W         | Environ & Resource Sci 10 .....#    | Political Science 3.....W           | Sociology 25 .....W                |
| Anthropology 143B.....D W         | Environmental Science               | Political Science 4.....W           | Sociology 125                      |
| Anthropology 144 .....D W         | and Policy 101 .....D               | Political Science 5.....W           | Sociology 131 .....D W             |
| Anthropology 145 .....D W         | Environ Science & Policy 133 ..D W  | Political Science 7.....W           | Sociology 132 .....D               |
| Anthropology 146 .....D W         | Environ Science & Policy 161 .....W | Political Science 100.....W         | Sociology 146 .....D W             |
| Anthropology 147 .....D W         | Environ Science & Policy 172        | Political Science 102.....W         | Sociology 156                      |
| Anthropology 148A.....D W         | Environmental Toxicol 138           | Political Science 105.....W         | Sociology 170                      |
| Anthropology 148B.....D W         | Exercise Science 105                | Political Science 106.....W         | Statistics 10 † .....W             |
| Anthropology 148C.....D W         | Exercise Science 120 .....D         | Political Science 107.....W         | Textiles and Clothing 7 .....D W   |
| Anthropology 149A.....D W         | Fiber and Polymer                   | Political Science 108.....W         | Textiles and Clothing 8 .....D     |
| Anthropology 149B.....D W         | Science 110 † .....W                | Political Science 109.....W         | Textiles and Clothing 107 .....D W |
| Anthropology 170 .....D W         | Food Science & Technol 2 †          | Political Science 112.....W         | Textiles and Clothing 174 .....D   |
| Anthropology 171 .....W           | Geography 2 .....#                  | Political Science 113.....W         | Veterinary Medicine 170 .....W     |
| Anthropology 172 .....D W         | Geology 115N † .....W               | Political Science 114.....W         | Viticulture and Enology 3 † .....# |
| Anthropology 173 .....D W         | History 132.....D W                 | Political Science 115.....W         | Women's Studies 50 † .....D W      |
| Anthropology 176 .....D W         | History 139A † .....W               | Political Science 116.....W         | Women's Studies 60 † .....D        |
| Anthropology 178 .....D W         | History 139B † .....W               | Political Science 118A.....W        | Women's Studies 70 † .....D        |
| Anthropology 179 .....D W         | History 140                         | Political Science 118B .....W       | Women's Studies 102.....D          |
| Anthropology 184                  | History 147A † .....W               | Political Science 118C.....W        | Women's Studies 130 † .....D       |
| Asian American Studies 1 .....D W | History 147B † .....W               | Political Science 121.....W         | Women's Studies 140.....D          |
| Asian American Studies 2 .....D W | History 147C † .....D W             | Political Science 122.....W         | Women's Studies 158 † .....D       |
| Asian American Studies 110 .....D | History 149 † .....D W              | Political Science 123.....W         | Women's Studies 182.....D W        |
| Asian American Studies 111 .....D | History 196B.....D W                | Political Science 124.....D W       | Women's Studies 184.....D W        |
| Asian American Studies 112 .....D | History and Philosophy              | Political Science 126.....D W       | Women's Studies 187.....D          |
| Chicana/Chicano Std 110 .....D W  | of Science 150.....D W              | Political Science 128.....W         | Women's Studies 195 † .....D       |
| Chicana/Chicano Std 120 .....D    | Human Development 13                | Political Science 129.....W         |                                    |
| Chicana/Chicano Std 121 .....D W  | Human Development 15                | Political Science 130.....W         |                                    |
| Chicana/Chicano Std 131 .....D    | Humanities 5 † .....W               | Political Science 131.....W         |                                    |
| Communication 103                 | Humanities 6 † .....W               | Political Science 132.....W         |                                    |
| Communication 105                 | Humanities 8 † .....D W             | Political Science 136.....W         |                                    |
| Communication 114                 | Humanities 60 † .....D W            | Political Science 141.....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).



## GENERAL EDUCATION COURSES

### Writing Experience

These courses satisfy the GE requirement for *writing experience*, provided you have previously satisfied the Subject A requirement. 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.

|                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| African American and African Studies 12, 15, 16, 17, 50, 52, 80, 107A, 107B, 107C, 111, 152, 162, 163, 170                                                                                                                                                                                                                                         | Consumer Sciences 100                                                                                                                                                                                                                                                                                                                                                                                                                      | German 47, 48, 111A, 111B, 111C, 111D, 111E, 111G, 111H, 112A, 113, 114, 115A, 117A, 117B, 117C, 118A, 118B, 118C, 118E, 118F, 119, 130, 140, 141                                                                                                                                                                                                                                                                                                                    | Music 10, 24A, 24B, 24C, 28, 105, 106, 110A, 110B, 110C, 110D, 110E, 110F, 121, 122, 124A, 124B, 126, 129                                                                                                                                                           |
| Agricultural and Resource Economics 15, 150                                                                                                                                                                                                                                                                                                        | Design 1, 100, 140, 142A, 142B, 143, 144                                                                                                                                                                                                                                                                                                                                                                                                   | 117B, 117C, 118A, 118B, 118C, 118E, 118F, 119, 130, 140, 141                                                                                                                                                                                                                                                                                                                                                                                                         | Native American Studies 5*, 10, 46, 55, 115, 120, 122, 130A, 130B, 130C, 134, 156, 180, 181A, 181B, 181C, 188                                                                                                                                                       |
| Agricultural Education 100, 160, 172                                                                                                                                                                                                                                                                                                               | Dramatic Art 1, 150, 154, 155, 156A, 156B, 156C                                                                                                                                                                                                                                                                                                                                                                                            | Greek 100, 101, 102, 103A, 103B, 104, 105, 111, 112, 113, 114, 115, 116                                                                                                                                                                                                                                                                                                                                                                                              | Nature and Culture 1, 100, 120                                                                                                                                                                                                                                      |
| Agricultural Systems and Environment 7, 121, 130                                                                                                                                                                                                                                                                                                   | East Asian Studies 113                                                                                                                                                                                                                                                                                                                                                                                                                     | Hebrew 101, 102                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Neurobiology, Physiology and Behavior 12G (course 12 required concurrently), 104L, 111L, 114                                                                                                                                                                        |
| American Studies 1A, 1B, 1C, 1E, 30, 110, 120, 130, 132, 133, 139, 151, 152, 153, 154, 155, 156                                                                                                                                                                                                                                                    | Education 110, 120                                                                                                                                                                                                                                                                                                                                                                                                                         | History 4A, 4B, 4C, 9A, 9B, 10C, 15, 17A, 17B, 72A, 72B, 111A, 111B, 111C, 112A, 112B, 115A, 115B, 115C, 121A, 121B, 121C, 125, 130A, 131B, 131C, 132, 136, 138A, 138B, 138C, 139A, 139B, 141, 143, 144, 145, 146A, 146B, 147A, 147B, 147C, 148A, 148B, 148C, 149, 151A, 151B, 151C, 151D, 161A, 161B, 162, 169A, 169B, 170A, 170B, 171A, 173, 174A, 174B, 174C, 177A, 177B, 178, 183A, 183B, 185A, 185B, 189C, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 196A, 196B | Nutrition 11, 114, 115, 117, 123                                                                                                                                                                                                                                    |
| Animal Science 1, 2, 42, 106, 124, 141, 146, 148, 193                                                                                                                                                                                                                                                                                              | Engineering 45                                                                                                                                                                                                                                                                                                                                                                                                                             | History and Philosophy of Science 130A, 130B, 131, 150                                                                                                                                                                                                                                                                                                                                                                                                               | Philosophy 1, 5, 6, 11, 13, 14, 15, 21, 22, 23, 24, 32, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 114, 115, 118, 119, 123, 127, 143, 145, 151                                                                                                               |
| Anthropology 1, 2, 4, 5, 15, 21, 23, 117, 120, 122, 123A, 123B, 124, 125B, 126, 127, 128, 129, 130, 131, 132N, 133, 135, 136, 139, 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 148C, 149A, 149B, 151, 152, 153, 154A, 154B, 155, 157L (course 157 required concurrently), 158, 170, 171, 172, 173, 176, 178, 179, 183 | Engineering: Chemical 155A, 155B                                                                                                                                                                                                                                                                                                                                                                                                           | Honors Challenge 94, 194                                                                                                                                                                                                                                                                                                                                                                                                                                             | Physics 122                                                                                                                                                                                                                                                         |
| Art History 25G (course 25 required concurrently), 153, 154A, 154B, 155, 163A, 163B, 163C, 164, 168, 176A, 176B, 177A, 177B, 178A, 178B, 178C, 179B, 182, 183A, 183B, 183C, 183E, 184, 188A, 188B, 188C, 188D, 188E                                                                                                                                | Engineering: Civil and Environment 146, 155, 160, 163                                                                                                                                                                                                                                                                                                                                                                                      | Human Development 19                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Plant Biology 11, 12, 141, 143, 151                                                                                                                                                                                                                                 |
| Art Studio 30, 131, 132A, 132B, 147, 148, 149, 150                                                                                                                                                                                                                                                                                                 | Engineering: Computer Science 15, 15AT, 167                                                                                                                                                                                                                                                                                                                                                                                                | Humanities 1D (course 1 required concurrently), 2, 3, 5, 6, 8, 9D (course 9 required concurrently), 10, 11, 12, 20A, 60, 118, 119, 120, 122, 124, 125, 176, 177, 180                                                                                                                                                                                                                                                                                                 | Plant Pathology 140                                                                                                                                                                                                                                                 |
| Asian American Studies 1, 2                                                                                                                                                                                                                                                                                                                        | Engineering: Materials Science 130, 132, 138, 140, 142, 146, 148                                                                                                                                                                                                                                                                                                                                                                           | Integrated Studies 8A, 8B, 8C                                                                                                                                                                                                                                                                                                                                                                                                                                        | Political Science 1, 2, 3, 4, 5, 7, 100, 102, 105, 106, 107, 108, 109, 112, 113, 114, 115, 116, 118A, 118B, 118C, 121, 122, 123, 124, 126, 128, 129, 130, 131, 132, 136, 141, 151, 152, 155, 160, 162, 163, 164, 165, 169, 174, 175, 180, 181, 182, 187, 192A, 192B |
| Atmospheric Science 5, 10                                                                                                                                                                                                                                                                                                                          | English 1*, 3*, 4, 5F, 18*, 19*, 30A, 30B, 45, 46A, 46B, 46C, 101*, 102*, 104A*, 104B*, 104C*, 104D*, 104E*, 105, 107, 110A, 110B, 111, 113A, 113B, 115, 117A, 117B, 117C, 118, 122, 123, 130, 133, 137, 142, 143, 144, 146, 149, 150A, 150B, 152, 153, 155A, 155B, 155C, 156, 158A, 158B, 159, 160, 161A, 161A, 161B, 161B, 162, 165, 166, 167, 171A, 171B, 173, 175, 177, 178, 179, 180, 181A, 181B, 182, 184, 185A, 185B, 187, 188, 189 | Italian 50, 108, 140, 141, 142, 145, 150                                                                                                                                                                                                                                                                                                                                                                                                                             | Pomology 10                                                                                                                                                                                                                                                         |
| Avian Sciences 11, 13                                                                                                                                                                                                                                                                                                                              | Entomology 17, 100L (course 100 required concurrently), 103, 107, 109, 110, 111, 119, 147, 153, 156L (course 156 required concurrently)                                                                                                                                                                                                                                                                                                    | Japanese 10, 15, 50, 101, 102, 103, 104, 105, 106, 107, 108                                                                                                                                                                                                                                                                                                                                                                                                          | Psychology 114, 120, 129, 147, 170, 175, 177                                                                                                                                                                                                                        |
| Biological Sciences 1C, 10                                                                                                                                                                                                                                                                                                                         | Environmental Horticulture 1                                                                                                                                                                                                                                                                                                                                                                                                               | Landscape Architecture 2, 30, 40, 168                                                                                                                                                                                                                                                                                                                                                                                                                                | Religious Studies 1, 2, 3A, 3B, 3C, 21, 23, 40, 115, 125, 141A, 141B, 141C, 142                                                                                                                                                                                     |
| Chemistry 10, 111, 115, 150                                                                                                                                                                                                                                                                                                                        | Environmental and Resource Sciences 10G (course 10 required concurrently), 60, 100L (course 100 required concurrently), 121, 131                                                                                                                                                                                                                                                                                                           | Latin 100, 101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 112, 114, 115, 116, 125                                                                                                                                                                                                                                                                                                                                                                                 | Russian 41, 42, 44, 123, 126, 129, 130, 131, 132, 139, 140, 141, 142, 143, 150, 151, 154, 166                                                                                                                                                                       |
| Chicana/Chicano Studies 10, 110, 121                                                                                                                                                                                                                                                                                                               | Environmental Science and Policy 10, 30G (course 30 required concurrently), 116G (course 116 required concurrently), 121, 133, 161, 166                                                                                                                                                                                                                                                                                                    | Linguistics 1, 50, 141, 152, 163, 166, 167                                                                                                                                                                                                                                                                                                                                                                                                                           | Science and Society 1, 2, 3, 5, 15, 20, 105, 120                                                                                                                                                                                                                    |
| Chinese 10, 11, 50, 104, 105, 106, 107, 108, 109A, 109B, 109C, 109D, 109E, 109F, 109G, 109H, 109I, 110                                                                                                                                                                                                                                             | Evolution and Ecology 121, 138                                                                                                                                                                                                                                                                                                                                                                                                             | Mathematics 108                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Science and Technology Studies 20                                                                                                                                                                                                                                   |
| Classics 1, 2, 3, 15, 20, 50, 102, 110, 140, 141, 142, 143, 150, 171, 174, 190                                                                                                                                                                                                                                                                     | Exercise Science 110, 118                                                                                                                                                                                                                                                                                                                                                                                                                  | Med—Cell Biology and Human Anatomy 101L (course 101 required concurrently)                                                                                                                                                                                                                                                                                                                                                                                           | Sociology 2, 3, 4, 5, 25, 100, 120, 126, 127, 128, 131, 134, 135, 141, 143B, 145A, 145B, 146, 149, 172, 181                                                                                                                                                         |
| Communication 1*                                                                                                                                                                                                                                                                                                                                   | Fiber and Polymer Science 110                                                                                                                                                                                                                                                                                                                                                                                                              | Medieval Studies 20A, 20B, 20C, 120A, 120D, 120E, 130A, 130B                                                                                                                                                                                                                                                                                                                                                                                                         | Soil Science 10, 112                                                                                                                                                                                                                                                |
| Community and Regional Development 1, 2, 118, 140, 151, 152, 154, 157, 176                                                                                                                                                                                                                                                                         | French 25, 50, 112, 113, 114                                                                                                                                                                                                                                                                                                                                                                                                               | Microbiology 10, 20E                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Spanish 148, 149                                                                                                                                                                                                                                                    |
| Comparative Literature 1*, 2*, 3*, 4*, 5, 6, 7, 8, 9, 12, 13, 14, 15, 20, 25, 53A, 53B, 120, 135, 138, 140, 141, 144, 145, 146, 147, 151, 152, 153, 154, 157, 158, 159, 160A, 160B, 161A, 161B, 163, 164A, 164B, 164C, 164D, 166A, 166B, 167, 168A, 168B, 169, 170, 180                                                                            | Geography 2G (course 2 required concurrently)                                                                                                                                                                                                                                                                                                                                                                                              | Molecular and Cellular Biology 10, 162                                                                                                                                                                                                                                                                                                                                                                                                                               | Statistics 10                                                                                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                    | Geology 3G (course 3 required concurrently), 20, 32, 36, 43, 100, 101, 105N, 106N, 108N, 109L (course 109 required concurrently), 110, 115N, 116G (course 116 required concurrently), 134, 135G (course 135 required concurrently), 143, 144N, 145N                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Textiles and Clothing 7, 107                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Veterinary Medicine 170                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Viticulture and Enology 3W (course 3 required concurrently), 90X, 123, 124, 125, 126, 130, 190X                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Wildlife, Fish and Conservation Biology 10, 102L, 121, 123, 140, 141, 153, 156                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Women's Studies 20, 50, 182, 184                                                                                                                                                                                                                                    |

\* This course may not be used to satisfy a college or university composition requirement and GE *writing experience* simultaneously.

## GENERAL EDUCATION COURSES

### 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.

|                                                                                                                                                                                                                                                                           |                                                                                                        |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| African American and African Studies 12, 15, 16, 17, 50, 52, 80, 100, 107A, 107B, 107C, 110, 111, 123, 133, 145A, 145B, 150A, 150B, 152, 156, 160, 162, 163, 170, 171                                                                                                     | Chicana/Chicano Studies 10, 21, 30, 50, 70, 110, 120, 121, 130, 131, 154                               | History 8, 9A, 9B, 15, 17A, 17B, 72A, 72B, 112A, 112B, 115A, 115B, 115C, 130A, 132, 142, 143, 144, 147C, 148A, 148B, 148C, 149, 151D, 161A, 161B, 162, 169A, 169B, 170A, 170B, 171A, 173, 174A, 177A, 177B, 178, 183A, 183B, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 194B, 194C, 196A, 196B | Nature and Culture 100<br>Nutrition 110, 120A, 120B<br>Philosophy 11, 14, 118, 119<br>Plant Biology 12<br>Political Science 124, 126, 142, 152, 166, 168, 169, 176<br>Psychology 114, 170<br>Religious Studies 1, 2, 3A, 3B, 3C, 21, 23, 115<br>Russian 44, 129, 139, 140, 141, 142, 143, 150, 154, 159, 166<br>Science and Society 1, 15<br>Sociology 4, 5, 128, 129, 130, 131, 132, 133, 134, 135, 145A, 145B, 146, 149, 172<br>Spanish 139, 141, 148, 149, 170, 172, 174, 176<br>Textiles and Clothing 7, 8, 107, 174<br>Wildlife, Fish and Conservation Biology 10<br>Women's Studies 20, 50, 60, 70, 102, 130, 140, 158, 160, 162, 164, 180, 182, 184, 187, 195 |
| Agricultural and Resource Economics 15, 115A, 150                                                                                                                                                                                                                         | Chinese 10, 11, 50, 104, 105, 106, 107, 108, 109A, 109B, 109C, 109D, 109E, 109F, 109G, 109H, 109I, 110 | History and Philosophy of Science 150                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| American Studies 1A, 1B, 1C, 1E, 30, 110, 120, 130, 132, 133, 139, 151, 152, 153, 154, 155, 156                                                                                                                                                                           | Classics 15, 171                                                                                       | Human Development 103, 160                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Anthropology 1, 2, 3, 4, 15, 20, 21, 23, 113, 117, 120, 122, 123A, 123B, 124, 125A, 125B, 126, 127, 128, 129, 130, 131, 133, 134N, 135, 139, 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 148C, 149A, 149B, 158, 170, 172, 173, 176, 178, 179 | Communication 135                                                                                      | Humanities 8, 10, 60, 118, 119, 120, 122                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Art History 1C, 1D, 150, 151, 152, 153, 163A, 163B, 163C, 164, 182, 183E, 188A                                                                                                                                                                                            | Community and Regional Development 1, 2, 151, 154, 157, 176                                            | International Agricultural Development 10, 103                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Art Studio 30, 131, 132B, 149                                                                                                                                                                                                                                             | Comparative Literature 4, 5, 6, 7, 9, 12, 25, 53A, 53B, 135, 138, 147, 151, 152, 153, 154, 159         | Italian 108, 141, 150                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Asian American Studies 1, 2, 110, 111, 112, 120                                                                                                                                                                                                                           | Consumer Sciences 100                                                                                  | Japanese 10, 15, 50, 101, 102, 103, 104, 105, 106, 107, 108                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | Dramatic Art 1, 150, 154, 155, 156A, 156B, 156C                                                        | Linguistics 163, 166, 167                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | East Asian Studies 113                                                                                 | Music 28, 105, 126, 129                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | Economics 110A, 115A                                                                                   | Native American Studies 1, 5, 10, 32, 33, 46, 55, 101, 107, 115, 116, 117, 118, 120, 122, 130A, 130B, 130C, 133, 134, 156, 157, 180, 181A, 181B, 181C, 188, 191                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | English 30A, 30B, 166, 167, 171A, 171B, 178, 179, 181A, 181B, 182, 185A, 185B                          |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | Environmental Science and Policy 101, 133                                                              |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | Exercise Science 120                                                                                   |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | French 124, 133                                                                                        |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                           | German 47, 112A, 141                                                                                   |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

### GENERAL EDUCATION REQUIREMENT FOR 1992-93 THROUGH 1995-96

(Applies only to students who entered UC Davis before 1996-97)

Students who entered UC Davis before the 1996-97 academic year may elect to complete the requirement in effect the year of their entrance to UC Davis or to fulfill the GE requirement for students entering in 1996-97 or thereafter.

If you elect to complete the GE requirement in effect the year of your entrance to UC Davis, you must meet the requirements and conditions listed below and select approved GE courses from the list on page 89.

If you elect to complete the GE requirement for 1996-97 and thereafter, you must meet all of the requirements and conditions explained in the preceding section and select approved GE courses from the lists on the preceding pages. Courses completed before 1996-97 may be counted towards fulfillment of the GE requirement only if they appear on the list of approved GE courses in the 1996-97 *General Catalog*. In all other cases, you cannot claim GE credit for a course you completed **before** it was an approved GE course.

#### Determining Your General Education Requirement

Each academic major, minor and degree program has been assigned to one of the three areas of General Education: **Civilization and Culture**, **Contemporary Societies**, and **Nature and Environment**. Each GE course has also been assigned to one of the three areas. You

must complete three courses in each of the two General Education areas outside of the area of your major. Two of the three courses in each area must be certified General Education courses. One of the three courses in each area must be an upper division course.

**Double majors** will satisfy the GE requirement in two areas only if the majors are assigned to two different areas. You will still be responsible for completing the GE requirement in the third area. Double majors in the same area do not reduce your GE requirements.

**Individual majors** are assigned to one of the three General Education areas when the major is approved by your college. If you have any questions concerning the GE area to which your major was assigned, consult your college dean's office.

**A minor** in an area outside the area of your major will satisfy your GE requirement in that minor's area. The minor in Science and Society may satisfy the GE requirement in any one of the three areas.

The specific General Education requirements for students who entered UC Davis from the 1992-93 academic year through the 1995-96 academic year are detailed in the General Education Requirements table on the next page. Students who entered UC Davis before the 1992-93 academic year should consult their college dean's office to determine their GE requirement.

#### Additional Conditions

In addition to the requirements outlined above and in the GE requirements table, you must meet the following conditions:

1. **Letter grading.** All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE

### Fulfilling the General Education Requirement

#### Students who entered UC Davis from the 1992-93 academic year through the 1995-96 academic year

(GE courses must be completed in the areas of General Education other than the area containing the major.)

#### Freshman or transfer student with 40 or fewer transfer units

6 GE courses:

- 3 courses in each of two areas;
- at least 1 upper division course in each area;
- at least 2 of the 3 courses in each area *must* come from the list of certified GE courses;
- the third course in each area may come from a list of courses approved for GE credit by your college.

#### Transfer student with more than 40 but fewer than 84 units

4 GE courses:

*Option 1:* 2 courses in each of two areas:

- at least 1 course in each area must be upper division;
- at least 1 course in each area must come from the list of certified GE courses;
- the second course in each area may come from a list of courses approved for GE credit by your college.

*Option 2:* 3 courses in one area;

- at least 1 course must be upper division;
- 2 courses must come from the list of certified GE courses;
- the remaining course may come from a list of courses approved for GE credit by your college;

**and**

- 1 upper division course in the other area, which must come from the list of certified GE courses.

#### Transfer student with 84 or more units

2 or 3 GE courses:

*Option 1:* 1 upper division course in each of two areas;

- both courses *must* come from the list of certified GE courses.

*Option 2:* 3 courses in one area;

- at least 1 course must be upper division;
- 2 courses *must* come from the list of certified GE courses;
- the remaining course may come from a list of courses approved for GE credit by your college

credit will be awarded for a course that is taken on a Passed/Not Passed basis.

2. **Subject A.** This requirement must be completed before you begin your GE course work.

Exception: GE credit may be earned before completing the Subject A requirement for the following course sequences which have been approved for the General Education Program: Chemistry 2A-2B, Economics 1A-1B and Music 3A-3B.

#### Transfer Credit

If you have transferred from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some

GE courses at UC Davis, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

The following courses and transfer credits will be used in determining the General Education requirement for transfer students:

- UC Davis Extension courses if they are accepted for transfer by Undergraduate Admissions and Outreach Services
- Advanced Placement credit
- Transfer work from other community colleges and four-year institutions

UC Davis Summer Sessions courses completed before entry do not count as “transfer credit” for determining your GE requirement. Successful completion of an approved GE course during a UC Davis Summer Session before entry, however, will count toward satisfaction of the GE requirement.

Consult the “Transfer Credit Evaluation” form prepared for you by Undergraduate Admissions and Outreach Services to determine your transfer credits.

#### GE Exemption

You are exempt from the UC Davis GE Requirement if you come from a California community college and have completed the “Intersegmental General Education Transfer Curriculum” (IGETC) or “Transfer Core Curriculum” (TCC), **or** you come from another campus of the University of California and have completed the lower division breadth or General Education requirements of that campus. Your college dean’s office can tell you whether you fall into either of these categories.

#### Approved General Education Clusters

General Education “clusters” are groups of closely related lower division GE courses. You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster. A cluster allows you to substitute lower division for any required upper division courses. There are two approved clusters in the area of Civilization and Culture: History 4A, 4B, 4C; and Comparative Literature 1, 2, 3. There is one approved cluster in the area of Nature and Environment: Animal Science 1, 2, 42.

#### GE Courses for Continuing Students

The list on the following page contains approved GE courses **for continuing students who entered UC Davis from 1992-93 through 1995-96** and have elected to complete the GE requirement in effect the year of their entrance to UC Davis. Please consult prior years’ catalogs or the Deans’ offices for the lists of courses approved in previous years.



**Approved courses for students who entered UC Davis from 1992-93 through 1995-96 and who have elected to complete the GE requirement in effect the year of their entrance to UC Davis.**

**Undergraduate Education**

Please consult prior years' catalogs or the Deans' offices for the lists of courses approved in previous years. Please note that you cannot claim GE credit for a course you completed **before** it was an approved GE course.

**Civilization and Culture**

*Courses in this area present dominant intellectual traditions, achievements and socio-political institutions, and increase awareness of cultural diversity within the Western tradition and in other civilizations.*

**Lower Division**

- American Studies 1B, 1E
- Art History 25/25G<sup>1</sup>
- Chinese 11
- Classics 15, 17B, 17C, 20, 50
- Comparative Literature 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 20, 25, 53B
- English 3, 4, 30A, 30B
- French 25
- German 47, 48
- History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 30, 72A, 72B
- History and Philosophy of Science 20
- Human Development 13
- Integrated Studies 3B<sup>2</sup>, 8B<sup>2</sup>
- Italian 50
- Landscape Architecture 40
- Linguistics 1, 50
- Medieval Studies 20A, 20B, 20C
- Music 3A-3B<sup>2</sup>, 10
- Native American Studies 5
- Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 31, 32
- Political Science 4
- Religious Studies 3A, 3B, 3C, 21, 23, 40
- Russian 44
- Viticulture and Enology 3-3W<sup>1</sup>

**Upper Division**

- Art History 178C
- Chinese 110
- Classics 110, 140, 141, 143, 150
- Comparative Literature 120, 135, 138, 141, 144, 152, 153, 157, 159, 160A, 160B, 161A, 161B, 163, 164A, 164B, 164D, 166A, 166B, 168A, 168B, 169, 170
- Dramatic Art 156A, 156B, 156C
- Education 120
- English 118, 156, 162, 171A, 171B, 182, 184
- French 112, 113, 114
- German 111A, 111E, 112A, 113, 114, 115A, 117A, 117B, 117C, 118A, 118B, 118C, 118E, 119, 130, 140, 141
- History 138A, 138B, 139A, 140, 147A, 147B, 147C, 161A, 169A, 169B, 175A, 177A, 177B, 188A
- History and Philosophy of Science 130A, 130B, 131
- Humanities 110A
- Italian 140, 141, 142
- Medieval Studies 120A, 120D, 120E
- Music 105, 110A, 110B, 110C, 110D, 110E, 129

- Native American Studies 130A, 130B, 156, 181A, 181B, 181C
- Philosophy 101, 102, 104, 105, 107, 108, 151
- Religious Studies 141A, 141B, 141C, 142
- Russian 129, 130, 131, 143, 151, 166
- Spanish 149
- Veterinary Medicine 170

**Contemporary Societies**

*Courses in this area create an awareness of critical economic, political and social problems of the contemporary world.*

**Lower Division**

- Agricultural and Resource Economics 15
- American Studies 1A
- Anthropology 2, 4
- Community and Regional Development 2
- Economics 1A-1B<sup>2</sup>
- Environmental and Resource Sciences 10-10G<sup>1</sup>
- Environmental Science and Policy 10
- Geography 2-2G<sup>1</sup>
- History 10, 72B
- Human Development 15
- Integrated Studies 3A<sup>4</sup>, 3E<sup>4</sup>, 8C<sup>4</sup>
- International Agricultural Development 10
- Native American Studies 10, 55
- Political Science 1, 2
- Religious Studies 1, 2
- Sociology 2, 3, 4, 25
- Women's Studies 50

**Upper Division**

- African American and African Studies 100, 133
- Agricultural and Resource Economics 120
- American Studies 120, 130
- Anthropology 101, 117, 124, 129, 130, 133, 134, 178
- Community and Regional Development 151, 153, 154
- Consumer Science 100
- Education 110
- Engineering 160
- Engineering: Applied Science 137
- Engineering: Civil and Environmental 160
- Environmental Science and Policy 101, 133, 161, 166
- Geography 155, 170, 171
- History 165, 188B
- Linguistics 163
- Native American Studies 115, 130C, 134, 180
- Philosophy 109, 118, 119
- Physics 137, 160
- Psychology 175, 177
- Russian 132
- Textiles and Clothing 107
- Veterinary Medicine 170
- Women's Studies 140

**Nature and Environment**

*Courses in this area provide students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations and appeal of science.*

**Lower Division**

- Agricultural Systems and Environment 1
- Animal Science 1, 2, 42
- Anthropology 1, 15, 23
- Astronomy 10
- Atmospheric Sciences 10
- Avian Sciences 11, 13
- Biological Sciences 10
- Chemistry 2A-2B<sup>2</sup>, 10
- Engineering: Civil and Environmental 30
- Engineering: Computer Science 15, 15AT
- Entomology 17
- Environmental Science and Policy 30-30G<sup>1</sup>
- Food Science and Technology 2
- Geology 1, 3-3G<sup>1</sup>, 32, 36, 43
- Human Development 19
- Integrated Studies 1A<sup>4</sup>, 8A<sup>4</sup>
- Microbiology 20
- Molecular and Cellular Biology 10
- Nutrition 10-11<sup>3</sup>, 20
- Philosophy 31
- Physics 10
- Plant Biology 11, 12
- Pomology 10
- Science and Society 20
- Soil Science 10
- Statistics 10
- Viticulture and Enology 3-3W<sup>1</sup>
- Wildlife, Fish and Conservation Biology 10

**Upper Division**

- Agricultural Systems & Environment 121
- Anthropology 152, 153
- Engineering 160
- Engineering: Applied Science 137
- Engineering: Computer Science 167
- Entomology 111, 119, 147, 153
- Environmental and Resource Sciences 121, 131
- Environmental Science and Policy 116-116G<sup>1</sup>
- Evolution and Ecology 121, 138
- Fiber and Polymer Science 110
- Geology 115N, 116-116G<sup>1</sup>
- History and Philosophy of Science 130A, 130B, 131
- Landscape Architecture 155
- Philosophy 108
- Physics 137, 160
- Plant Biology 151
- Plant Pathology 140

<sup>1</sup>These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.

<sup>2</sup>This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.

<sup>3</sup>Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).

<sup>4</sup>GE courses in Integrated Studies are open only to students in the Integrated Studies program.



**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**. 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

**Credit in University Extension Courses.** Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement *provided* written approval has been obtained from the dean *before* registering. Units of credit allowed by the dean may be less than the number of units listed for a course. No grade points are assigned for courses completed through University Extension.

**Residence Requirement**

Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the Davis campus. Not more than 28 of these 35 quarter units may be completed in summer session courses at UC Davis.

**Scholarship Requirement**

Students in the College are required to attain a minimum grade point average of 2.0 for all courses specified as depth subject matter in their major. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Undergraduate Majors and Courses Subcommittee and printed in this catalog, or (b) an individual major approved by the Individual Major Subcommittee.

**English Composition Requirement**

The English Composition requirement can be met in one of two ways:

1. by taking, before you have completed 120 units, **either** two courses emphasizing written expression **or** one course emphasizing written expression and one course emphasizing oral expression. The following UC Davis courses satisfy this requirement:
  - (a) one course must be selected from English 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, or 104E (courses with primary emphasis in writing skills);

(b) one course selected from the courses not selected above, or from English 102, 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).

**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.

**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 the "Academic Information" chapter).

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.

**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 catalog in effect either during the three years immediately preceding your transfer to 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 Engineering

#### Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower Division Program (or an approved equivalent program for students who transfer into the College with 90 or more quarter units) and a specified Upper Division Program. Detailed requirements for the approved curricula are given in the "Programs and Courses" section of this catalog; to see the courses required in your major, consult this section.

The minimum number of required units in the combined Lower and Upper Division Programs varies, with the curriculum, from 180 to 195.

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 Office, can be a valuable aid in resolving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of six professors and six (non-voting) students. A negative decision by the committee may be appealed to the College faculty for action at a regular meeting.

**Transfer students.** If you are admitted with 90 or more quarter units, you are classified as having upper division standing, but you are required to complete the minimum number of quarter units in the subject areas specified below before your Lower Division Program is considered complete. You may, however, start your Upper Division Program while completing your Lower Division Program requirements. For more specific advice on your requirements, see the transfer counselor of your institution.

| Subject Areas<br>Units                                                                                                                                                                                                                                                         | Minimum<br>Quarter<br>Units |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Mathematics</b> (calculus, differential equations, linear algebra, vector analysis).....                                                                                                                                                                                    | 22                          |
| <b>Physical and biological sciences</b> (typically, at least 10 units must be in general chemistry and at least 12 units in physics courses designed for engineering and physical science students).....                                                                       | 22-26                       |
| <b>Engineering</b> (lower division subjects such as graphics, properties of materials, surveying, computer programming, statics and circuit theory. These courses must include statics, circuits and FORTRAN for all but Electrical and Computer Engineering and Computer Sci- |                             |

ence majors, who must take C and C++ programming. Students majoring in Mechanical, Aeronautical, Materials Science, Civil, Electrical or Computer Engineering, or Computer Science may have additional course requirements specific to their respective majors.

Because of additional lower division chemistry requirements, Chemical Engineering majors may elect to take only 10 units—FORTRAN, circuit theory and statics—of engineering in their lower division programs)...15-26

**Written and oral expression** English 1 or 3 and Communication 1 or 3, or courses that are their equivalents .....8

**Humanities–Social Sciences** (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study) .....5-12

**Additional subjects** (Chemical Engineering majors should cover quantitative analysis and one course in organic chemistry with a laboratory component during their sophomore year) .....7-8

**Total** .....90

Once you have completed the Lower Division Program and fulfilled these specified subject area requirements, you need not take additional lower division courses, **except** those that are prerequisite to upper division courses in your curriculum. For additional information on core prerequisite courses, please contact your department or college adviser.

**Credit in University Extension Courses.** Appropriate courses taken through University Extension may be used for degree credit; however, you may use a maximum of 16 units of courses taken through University Extension for degree credit. Simultaneous registration in resident courses and Extension courses requires *prior approval* by the College's Associate Dean for Undergraduate Studies. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

#### 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 2.0 grade point average for all course work within Engineering.

#### English Composition Requirement (Upper Division)

After completing 70 quarter units, you may elect to satisfy the upper division English Composition requirement by passing the English Composition Examination administered by the College of Letters and Science. (You should take it early in your junior year and must take it before your last quarter. Units of credit are not given for passing this examination.)

Or, upon completion of 90 quarter units, you may satisfy this requirement by completing English 101, 102, 104A, or 104E with a grade of C– or higher.

This requirement is in addition to the expository writ-

ing course requirement (English 1 or 3; Comparative Literature 1, 2, 3 or 4; or Native American Studies 5) specified in the Lower Division Programs.

During the 1998-99 academic year, the English Composition Examination will be offered on the following three Saturdays: October 24, 1998; January 30, 1999; and April 24, 1999. Sign-up rosters will be posted on the bulletin board near the main English Department office (176 Voorhies), Monday until noon on Friday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by noon on Friday. You must obtain the English Composition Examination form, available at the UCD Bookstore, to take the exam.

### 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 at least 24 quarter units of such 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 four kinds of elective courses in the engineering curricula: *Humanities–Social Sciences*, *General Education*, *technical and unrestricted*. Transfer students have an additional set of electives: *Physical and Biological Sciences electives* or *Mathematics/Science electives*.

**Humanities–Social Sciences electives:** Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The Humanities–Social Sciences (HSS) electives have been selected within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history and the fine arts. The social sciences include areas such as anthropology, political science, sociology, psychology and economics.

You must take at least 24 quarter units of course work in the humanities and social sciences; Computer Science and Engineering majors must have 33 quarter units. For all engineering majors at least 8 of these units must be upper division courses. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical

skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course. Students enrolled in the Davis Honors Challenge may receive HSS credit for approved Honors Seminars; consult with the Undergraduate Advising Office for a list of approved seminars each quarter. You may petition for HSS credit for 92, 98, 99, 192, 197, 198 and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Your HSS electives should be selected to include a comprehensive and coherent set of courses and may, in some cases, be integrated with your General Education electives, as described in the next section. HSS electives must be selected from the following list.

African American and African Studies 10, 12, 15, 50, 51, 52, 80, 100, 101, 107A, 107B, 107C, 110, 123, 130, 133, 141, 145A, 145B, 150A, 150B, 151, 152, 153, 155A, 160, 162, 170, 171  
 Agricultural and Resource Economics 1, 15, 100A, 100B, 120, 141, 141M, 150, 175, 176  
 American Studies 1A, 1B, 1C, 1E, 1F, 2, 30, 101A-H, 110, 111, 115, 120, 125, 130, 151, 152, 153, 154, 155, 156  
 Anthropology 2, 3, 4, 20, 21, 23, 101, 110, 112, 113, 117 through 149B, 170 through 179, 184  
 Art History 1A, 1B, 1C, 1D, 25, 150 through 188C, 190 (also Art History 1AG, 1BG, 1CG, 1DG and 25G when taken concurrently with Art History 1A, 1B, 1C, 1D and 25)  
 Art Studio 10, 147 through 150  
 Asian American Studies 1, 2, 20, 100, 101, 110, 111, 112, 120, 130, 136, 150, 155  
 Chicana/Chicano Studies 10, 21, 30, 40, 50, 60, 70, 100 through 140, 154, 155, 156, 165  
 Chinese 10, 11, 50, 104 through 109A-I, 110, 114, 115, 116, 130, 131, 132, 140, 160  
 Classics 1, 2, 3, 10, 15, 20, 50, 102, 110, 140, 141, 142, 143, 150, 171, 174, 175  
 Communication 103 through 145, 152  
 Community and Regional Development 1, 2, 17, 118, 140, 141, 142, 151, 152 through 154, 157, 158, 161 through 164, 171 through 178, 190  
 Comparative Literature 1 through 53B, 120, 135 through 180  
 Consumer Science 100  
 Design 1, 140, 142A, 142B, 143, 144  
 Dramatic Art 1, 20, 115, 150 through 159  
 East Asian Studies 113  
 Economics 1A-1B, 100, 101, 103, 104, 105, 110A through 136B, 151A through 175  
 Economy, Justice and Society 100  
 Education 110, 120, 130, 151, 153  
 English 3, 4, 30A, 30B, 46A, 46B, 46C, 105, 107, 110A through 189  
 Environmental Science and Policy 101, 133, 160 through 162, 164 through 167, 175  
 Exercise Science 105  
 French 25, 50, 101, 102, 103, 107N, 108, 112 through 133, 140, 141, 160, 161, 162  
 Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 10, 120, 121, 123, 126, 131, 143, 151, 155, 156, 161, 170, 171

German 47, 48, 50, 51, 101A, 101B, 105, 106, 107, 108,  
 110 through 133, 134, 140, 141, 142C, 144, 145,  
 150, 160, 165 through 168, 176, 185  
 Greek 100 through 116  
 History 3 through 86, 101 through 104A, 110 through  
 191F, 194A through 196B  
 History and Philosophy of Science 20, 130A, 130B, 131,  
 150  
 Human Development 13, 15, 19, 100A through 103,  
 110, 130, 131, 132, 151, 160, 162  
 Humanities 10, 20A, 110A, 120, 122, 124, 125  
 Integrated Studies 1A, 2A, 2C, 2E, 3A, 3B, 3E, 8, 8B, 8C  
 (Open only to students accepted to the Integrated  
 Studies Program)  
 International Agricultural Development 10, 103, 104  
 Italian 50, 105, 107 through 145, 150  
 Japanese 10, 15, 25, 50, 101 through 108, 131 through  
 135  
 Landscape Architecture 2, 30, 40  
 Latin 100 through 116, 125  
 Linguistics 1, 4, 10 through 15, 50, 103A, 103B, 104,  
 105, 121, 131, 141, 151, 152, 163, 166, 167, 171,  
 173  
 Medieval Studies 20A, 20B, 20C, 120A-F, 130A, 130B  
 Music 3A, 3B, 4A, 4B, 4C, 5A, 5B, 5C, 10, 24A through  
 28, 105, 109, 110A, 110B, 110C, 110D, 110E, 121,  
 122, 124A, 124B, 125, 126, 127, 129  
 Native American Studies 1, 5, 10, 32, 33, 55, 101  
 through 191  
 Nature and Culture 1, 100, 120  
 Nutrition 20, 118  
 Philosophy 1, 11, 13, 14, 15, 21, 22, 23, 24, 32, 101  
 through 111, 114 through 127, 137, 143 through  
 177, 190  
 Political Science 1 through 7, 100 through 113, 115  
 through 191  
 Psychology 1, 112, 114, 120, 130, 131, 132, 133, 136  
 through 150, 165, 168, 175, 177, 183  
 Religious Studies 1 through 75, 100 through 178A-E  
 Russian 41, 42, 44, 121 through 154, 160, 166  
 Sociology 1, 2, 3, 4, 5, 25, 100, 118 through 185  
 Spanish 100, 111N, 112N, 114N, 115N, 116, 118, 130  
 through 176  
 Textiles and Clothing 7, 107  
 Women's Studies 20, 50, 60, 70, 80, 102, 103, 104, 130,  
 140, 158, 160, 162, 164, 180, 182, 184, 187

**General Education electives** are used to satisfy a campus requirement and are chosen from the list of General Education Courses for 1998-99 given earlier in this chapter. Since all engineering majors are in the Science and Engineering GE *topical breadth* area, you must fulfill the campus requirement by taking courses in the Arts and Humanities area and the Social Sciences area.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) course work is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses. *You may satisfy the HSS and GE requirements simultaneously*, provided that you take the courses that are listed on both the list of HSS courses above and the GE courses list shown earlier in this chapter.

In satisfying the GE requirement, note that (a) *you must take GE courses for a letter grade*, and (b) *you must fulfill*

the Subject A requirement before you can receive GE credit for any course providing writing experience credit. In consultation with your academic adviser, you should attempt to design a comprehensive and coherent set of courses using both the HSS electives and GE electives.

**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 to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198 and 199, unless further restrictions are imposed on your major. Academic credit for 199 courses is limited to a maximum of 5 units per quarter for each substantially different project. Academic credit for engineering internship courses (192s) is also limited to a maximum of 5 units per quarter.

With the exception of the following courses, all upper division courses in engineering, physics, chemistry, mathematics and statistics may be taken as technical electives. The courses which may *not* be used are:

Applied Science Engineering 137 (restricted to one unit of technical elective)  
Physics 137 and 160 (restricted to one unit of technical elective), 194H, 195, 197T, 198, 199  
Chemistry 194H, 197, 198, 199  
Engineering 160 (restricted to one unit of technical elective)  
Mathematics 192, 197TC, 198, 199  
Statistics 102

In addition to upper division engineering, physics, chemistry, mathematics and statistics courses, the following courses may be taken as technical electives:

Agricultural and Resource Economics 100A, 100B, 106, 113, 118, 136, 138, 139, 155, 156, 157, 171A, 171B, 175, 176  
Agricultural Systems and Environment, any upper division course except 101 and 190 through 199  
Anatomy, Physiology, and Cell Biology 100  
Animal Genetics 101, 107, 108, 109, 110  
Animal Science 104, 105  
Applied Biological Systems Technology 110L, 134, 161, 163, 180, 181, 182  
Atmospheric Science 111, 120, 121A, 121B, 124, 128, 133, 149, 150, 158, 160  
Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, 120, 120P, 122, 122P  
Chemistry 2B, 2BH (if not used for your major requirement), 2C, 2CH, 8A, 8B  
Economics 140  
Environmental Science and Policy 100, 128, 128L, 140, 150A, 150B, 150C, 151, 151L, 155, 155L, 163, 167, 168A, 168B, 173, 179  
Environmental Toxicology 101, 114A, 114B, 128, 131, 132, 135, 155  
Evolution and Ecology 100, 102, 103, 105, 108, 112, 112L, 117, 134, 134L, 140, 170, 170L  
Fiber and Polymer Science 100, 150, 161, 161L  
Food Science and Technology 100A, 100B, 100C, 101A, 101B, 102A, 102B, 103, 104, 107, 104L, 107A, 107B, 108, 109, 110A, 110B, 119, 120, 120L, 121, 122, 123, 123L, 127, 128, 131, 140, 151, 159, 160, 180

Geology 17, 50, 50L, 100, 100L, 101, 101L, 102N, 108N, 109, 109L, 134, 143, 144N, 145N, 146N, 150A, 150B, 150C, 152N, 161, 162N, 163, 170  
Hydrologic Science 110, 115, 117, 122, 122L, 124, 134, 141, 142, 143, 145A, 145B, 150, 151A, 151B, 182  
Management 11A, 11B  
Microbiology 102, 102L, 105, 120, 120L, 140, 150, 155L, 160, 162, 177, 177L  
Molecular and Cellular Biology 120L, 121, 122, 123, 126, 140L, 141, 142, 146, 150, 150L, 151L, 160L, 161, 162, 163, 164, 166, 170L  
Neurobiology, Physiology and Behavior, any upper division course  
Plant Biology 105, 108, 111, 111D, 111L, 112, 112D, 113, 113D, 116, 117, 118, 121, 123, 125, 143, 144, 148, 152, 153, 154, 157, 158, 160, 161A, 161B, 173, 174, 175, 176, 177, 178  
Plant Pathology 119, 120, 125, 130  
Soil Science 100, 102, 107, 109, 111, 118, 120  
Wildlife, Fish and Conservation Biology 100, 102, 102L, 110, 110L, 111, 111L, 120, 120L, 121, 122, 123, 130, 131, 136, 140, 151, 152, 153, 154

You are urged to discuss the selection of technical elective courses with your academic adviser.

**Unrestricted electives.** You may count any course for which university credit is allowed as an unrestricted elective in the engineering curricula.

**Physical and Biological Science electives.** Engineering students are required to have 26 units in physical and biological sciences, typically 10 units of chemistry and 16 units of physics. Students who transfer into the College of Engineering with advanced standing are required to complete 26 units of physical and biological science by graduation, but need only have completed 5-10 units of chemistry (depending on major) and 12 units of physics by the time of transfer. Transfer students may make up the remaining 4 units by taking 4 additional units of chemistry, 4 additional units of physics, or 4 units in courses selected from any of the curricula listed below, with the restrictions that follow.

Atmospheric Science  
Biological Science  
Chemistry  
Evolution and Ecology  
Geology  
Microbiology  
Molecular and Cellular Biology  
Neurobiology, Physiology and Behavior  
Physics  
Plant Biology

All courses in these departments numbered 10 and 190–199 are excluded for credit, as are the following courses:

Evolution and Ecology 138  
Geology 1-1L, 3-3G-3L, 43, 116-116G, 135-135G  
Microbiology 20  
Physics 137, 160  
Plant Biology 1, 11, 12

### Degree Check

Use the Degree Requirement Check sheets for each of the curricula for monitoring your progress toward a



degree. The Undergraduate Office will prepare only one *unofficial* preliminary degree check for you (preferably at the end of your junior year). You should also request an exit interview during the quarter before you plan to graduate. To have this degree check prepared, submit a signed Degree Check Request and request an appointment. You can get further information concerning these services and the forms for requesting a degree check or an exit interview in the Undergraduate Advising Office.

### Degree Requirement Changes

Since engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. To ensure that you benefit from these changes, the College of Engineering has established a policy that you must fulfill the degree requirements stated in the catalog for the year in which you complete degree work or in the catalog for the year immediately preceding.

## 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 normally 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), 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 the Academic Information section 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 unlim-

ited 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 3.3 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 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 Davis campus.* This limitation applies to *all* Davis undergraduates, including Letters and Science students.

**Limitation on Credit for University Extension Courses.** Students may apply credit earned in University Extension courses toward the 180-unit requirement only when written approval has been obtained from the dean before registration. The degree credit allowed by the dean for Extension courses is usually less than the unit value listed in the course description. A maximum of 9 units may be offered for elective credit only. Such units and courses may not be applied toward fulfillment of the Area, Foreign Language, Upper Division, or Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

**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 under Nonstandard courses below.)



*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 under Nonstandard courses above.)

*Tutoring courses (97T, 97TC, 197T, 197TC):* 10 units maximum. (See under 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 Davis campus. (Work completed while registered in the Education Abroad Program does not satisfy campus or College Residence requirements.)

### Scholarship Requirement

The minimum grade point average to satisfy the scholarship requirement is 2.0 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 minimal 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 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 in English composition from English 1, 3, 18, 19, Comparative Literature 1, 2, 3 or 4, or Native American Studies 5; **and**
  - (b) English 101, 102, or 104A, 104B, 104C, 104D, or 104E (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 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, 104E, Comparative Literature 1, 2, 3, 4, or Native American Studies 5 will be accepted toward satisfaction of the English Composition requirement. Note that English 101 and 104A, 104B, 104C, 104D, and 104E 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 English 101, 102, 104A, 104B, 104C, 104D, or 104E at UC Davis.



**English Composition Examination.** This academic year, the no-fee examination will be offered on the following Saturday mornings:

October 24, 1998

January 30, 1999

April 24, 1999

There are no examinations given during the summer. Sign-up rosters will be posted on the bulletin board near the main English Department office (176 Voorhies), Monday until noon on Friday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by noon Friday. The English Composition Examination form, available at the UCD Bookstore, is required.

### 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, Music, or Dramatic Art from outside the student's major;

OR

- c. a certified minor 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

**Foreign Language Requirement  
(A.B. and B.A.S. degrees)**

The Foreign Language requirement may be satisfied in any language offered at UC Davis, 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 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.** Plan to complete the Foreign Language Requirement by the end of your first or second year, as program priorities permit. This is particularly important if you plan to apply for the university's Education Abroad Program. 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.

You may validate your knowledge of a language learned in high school by taking this test. 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.

2. *College Board SAT II: 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 and Outreach Services, 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. *Course Completion in College (or the equivalent).* A.B. and B.A.S. degrees—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S degree—none, but as is required in the major program.

If you have successfully completed (C– or better) 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 on a P/NP grading basis 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.]

5. *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

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 requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirements. 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  
 Animal Science 135  
 Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158  
 Astronomy  
 Avian Sciences 13  
 Biological Sciences: All courses except 19  
 Cell Biology and Human Anatomy 101, 101L  
 Chemistry  
 Engineering 5, 102  
 Engineering: Civil and Environmental 30  
 Engineering: Computer Science 10, 30, 40, 50, 100, 110, 120, 122A, 122B, 140A, 140B, 142, 150, 151A, 151B, 152A, 152B, 153, 154A, 154B, 158, 160, 163, 165A, 165B, 168, 170, 172, 175, 177, 178  
 Engineering: Electrical and Computer 170  
 Entomology 10, 100, 153  
 Environmental and Resource Sciences 131  
 Environmental Science and Policy 30, 100, 121, 126  
 Environmental Toxicology 101  
 Evolution and Ecology  
 Exercise Science 101, 102, 103, 110, 111, 112, 113, 115, 116, 117, 126, 133, 135  
 Fiber and Polymer Science 110  
 Food Science and Technology 2, 100A, 100B, 101A, 101B  
 Geography 1  
 Geology  
 Integrated Studies 1A, 8A  
 Mathematics  
 Microbiology  
 Molecular and Cellular Biology  
 Neurobiology, Physiology and Behavior  
 Nutrition 10, 101, 110, 111  
 Pathology, Microbiology and Immunology 126  
 Physics  
 Plant Biology  
 Psychology 41, 100, 101, 103, 104, 105, 108, 113, 124, 129, 130, 131, 133, 134, 135, 150, 152, 160, 163, 180B  
 Statistics



**GRADUATE STUDIES**

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## GRADUATE STUDIES

Information:  
250 Mrak Hall  
530-752-0655;  
<http://pubweb.ucdavis.edu/documents/gradstudies/homepage.htm>

UC Davis offers advanced degrees in more than 70 graduate programs. Students' graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing 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 expansion of established degree programs and facilitates the development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups. You will find a list of the graduate degrees available at UC Davis in the front of this catalog.

Graduate study is administered 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 to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, 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. Criteria also attempt to take into account any prior disadvantages applicants have experienced that may bear on future achievements and services.

### Applying for Admission

World Wide Web (applications for admission):  
<https://secureweb.ucdavis.edu:2443/>

**March 1** Deadline for **international students** to file applications for admission to graduate standing, with complete credentials, with the program or department

**April 1** Deadline for **United States residents** to file applications for admission to graduate standing, with complete credentials, with the program or department

Applications are accepted for fall quarter only. You may apply for admission to graduate study via the World Wide Web at: <https://secureweb.ucdavis.edu:2443/>. If you apply electronically, the \$40 nonrefundable application fee and official transcripts from each college and university you have attended must be mailed directly to the program to which you are applying.

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 or research assistant or of receiving financial support are greatly enhanced by applying early. The application deadlines are as noted above, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

If you do not apply electronically, you may request the application for admission and fellowship from the Office of Graduate Studies, One Shields Avenue, University of California, Davis, CA 95616. The completed application form, the application fee and official transcripts must be sent directly to the program to which you are applying. Supplemental application materials required by the graduate program must be sent directly to the graduate adviser for that program.

The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to 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

**April 1** Deadline to file applications for **readmission** to graduate status with Graduate Studies

If you were formerly registered at UC Davis as a graduate student and wish to return to the **same degree pro-**



**gram and major**, you must apply for readmission and pay the readmission application fee of \$40. The readmission application must be filed with Graduate Studies by April 1 (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 dean of Graduate Studies. 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. Obtain an application from the Graduate Studies office. Transcripts of all work undertaken since you were last registered in graduate status at 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

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 a 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. Completed applications from international students along with the nonrefundable \$40 application fee must be received by the program to which you are applying by March 1, unless your proposed program has an earlier deadline.

International students may also apply via the World Wide Web at <https://secureweb.ucdavis.edu:2443/>

**English Requirement.** If English is not your native language and you have not studied at an institution where English was the language of instruction, you will be required to demonstrate proficiency in English by submitting your test scores from the Test of English as a Foreign Language (TOEFL). This test is given six times each year by the Educational Testing Service, CN6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550 (or 600 for Linguistics).

**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 avail-

ability of sufficient funding for your graduate program (see International Student Services in the "Academic Advising" chapter for complete details). No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of registration at UC Davis.

### Fees

At the time of registration each quarter, every student must pay the following fees.

#### Graduate Student Fees (per quarter)

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

|                                                  |                   |
|--------------------------------------------------|-------------------|
| University Registration Fee . . . . .            | \$238.00          |
| Educational Fee . . . . .                        | \$1,029.00        |
| Memorial Union Fee . . . . .                     | \$28.50           |
| Student Health Services Fee . . . . .            | \$32.00           |
| Health Insurance* . . . . .                      | \$133.50          |
| Graduate Student Association Fee . . . . .       | \$6.50            |
| Student Facilities Safety Fee . . . . .          | \$22.00           |
| <b>Total Full-time California Resident . . .</b> | <b>\$1,489.50</b> |
| Nonresident tuition . . . . .                    | \$3,128.00        |
| <b>Total Full-time Nonresident . . . . .</b>     | <b>\$4,617.50</b> |
| Reduced Nonresident Tuition** . . . . .          | \$782.00          |
| <b>Total Full-time Nonresident, Reduced . .</b>  | <b>\$2,346.00</b> |
| Total Part-time California Resident . . . . .    | \$979.00          |
| Total Part-time Nonresident . . . . .            | \$2,539.00        |
| Total Employee-student . . . . .                 | \$473.50          |

\*Graduate students must purchase the Graduate Student Health Insurance Plan (GSHIP) unless they are able to prove comparable coverage under another insurance plan. GSHIP is approximately \$133.50 per quarter.

\*\*Nonresident Ph.D. candidates who have advanced to candidacy by the first day of the quarter will be assessed 25% of the 1998-99 nonresident tuition charge. The reduced nonresident tuition will be applied for three calendar years, after which enrolled nonresident advanced doctoral students will again be charged the full nonresident tuition in effect at that time.

### 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 published in the Graduate Program Directory, or as documented by the program. 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 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

*Intramural sports each year draw more than 13,100 students for men's and women's teams.*



**GRADUATE STUDENT DEADLINES\***

|                                                                                                                                                                                          | FALL<br>1998 | WINTER<br>1999 | SPRING<br>1999 | SUMMER<br>1999<br>(for Sept. 1999) | FALL<br>1999 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------|----------------|------------------------------------|--------------|
| Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the dean of Graduate Studies                                              | Sept. 21     | Jan. 4         | Feb. 22        | June 1                             | Sept. 22     |
| Deadline for candidates for master's degrees to file theses with the committee in charge                                                                                                 | Nov. 3       | Feb. 1         | May 3          | July 21                            |              |
| Deadline for candidates for master's degrees to file theses with the dean of Graduate Studies                                                                                            | Nov. 30      | Mar. 1         | June 1         | Sept. 3                            |              |
| Deadline for candidates for master's degrees to file final report on comprehensive examination with the dean of Graduate Studies                                                         | Dec. 19      | Mar. 25        | June 18        | Sept. 17                           |              |
| 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. 10      | Nov. 9         | Feb. 1         | May 17                             | Aug. 11      |
| Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education and Doctor of Engineering to file theses with the committee in charge                               | Oct. 1       | Jan. 4         | Apr. 1         | July 1                             |              |
| Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file theses with the dean of Graduate Studies                         | Nov. 30      | Mar. 1         | June 1         | Sept. 3                            |              |

\* Deadlines are subject to change without notice.

field. It is not awarded merely for fulfillment of technical requirements, such as residence, or the completion of specific courses.

### Master's Degree

Students working toward a master's degree must be registered in residence for at least three 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 Davis campus. With the consent of the graduate adviser and the dean of Graduate Studies, however, some work taken elsewhere may be credited toward your degree. The normal limit for such transfer credit is 6 units from another institution, or 12 concurrent units, 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.

### Ph.D. 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 of the chosen field of study.

Students working toward a doctorate must be registered and in university residence for a minimum of six regular 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 in certain Ph.D. programs may participate in a **Designated Emphasis**, a specialization that might include a new method of inquiry or an important field of application which is related to two or more existing Ph.D. programs. The Designated Emphasis is awarded in conjunction with the Ph.D. 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 Biotechnology; Computational Science; Critical Theory; Economy, Justice and Society; Feminist Theory and Research; International Nutrition; Native American Studies; and Social Theory and Comparative History.

## 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 in Graduate Studies and should be submitted six weeks before the beginning of the quarter in which you wish to participate in the program.

## Fellowships, Assistantships and Loans

World Wide Web (applications for fellowships and scholarships): <http://pubweb.ucdavis.edu/documents/gradstudies/support/studsup.htm>

Financial support for graduate study at UC Davis is available in several forms: teaching and research assistantships, financial aid and fellowships/scholarships.

Financial aid, which is available to U.S. citizens, permanent residents or immigrants only, 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) 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.

Fellowships and graduate scholarships are awarded primarily on the basis of scholarship 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 or in-state fee award is 3.5 (A=4.0); for nonresident tuition fellowships the minimum is 3.25. Applicants must be U.S. citizens, or permanent residents of the U.S., or immigrants. U.S. citizens and permanent residents are eligible for nonresident tuition fellowships for their first three quarters only at UC Davis. New international students may be awarded nonresident tuition fellowships, but not stipend or in-state fee fellowships, in their first three quarters.

Applications for fellowships and graduate scholarships are due by **January 15** for awards beginning fall quarter. Information for both new and continuing students and application materials for fellowships and graduate scholarships are available on the World Wide Web. You may print the application forms, complete them and submit them by mail. The fellowship applications may NOT be submitted electronically.

Entering students submit the "Application for Graduate Admission and Fellowship;" continuing students file an "Application for Fellowships and Graduate Scholarships for Continuing UCD Graduate Students" with their graduate program.

## Graduate Certificate Program for Engineers

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects and requires 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 program 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 Program may be found in the *College of Engineering Bulletin*.

## Teacher Credential Programs

Information:  
Division of Education  
Student Services Office  
2078 Academic Surge  
530-752-0757; [jgmacdonald@ucdavis.edu](mailto:jgmacdonald@ucdavis.edu);  
<http://education.ucdavis.edu/>

Department of Agronomy (Agriculture Teaching Credential)  
Agricultural Education Program Office  
132 or 155 Hunt Hall  
530-752-3040 or 752-4369

The Division of Education offers programs for students interested in becoming elementary or secondary teachers. The elementary education program prepares you to teach all the subjects commonly taught in an elementary classroom. In addition, it offers the option of receiving in-depth training for teaching in a bilingual (Spanish) or English as a Second Language classroom. The secondary education program is designed to prepare teachers who will work in grades 7 through 12 in the following areas: agriculture, English, foreign language (Spanish), science (biology, chemistry, geoscience and physics), math, music, physical education and social studies education.

To apply you need to have done the following:

- completed a bachelor's degree;
- completed most of the required course work in the area you want to teach, or have taken a National Teacher Exam (NTE) and National Evaluation Systems (NES) exam in the area you want to teach;

- taken the California Basic Education Skill Test (CBEST);
- worked with school-age children; and,
- met Graduate Studies minimum GPA requirement (3.0).

There are additional requirements that we encourage you to take as undergraduates. Information is available in the Student Services Office.

The teaching credential program starts in the fall quarter only and is nine months long. It is a full-time professional program with a rigorous schedule. Student teachers are in classrooms in the morning and early afternoon and back on campus in the afternoon and evening for course work. The student teaching assignments generally are in the following communities: Davis, Winters, Woodland, Dixon, Vacaville, Fairfield, Sacramento and West Sacramento. Student teachers are required to participate in the schools in the role of a regularly credentialed teacher. A typical course schedule follows:

- student teaching
- teaching methods courses [on how to teach your subject area(s) and grade level(s)]
- reading methods course
- computer education course
- health education course
- special education course

Upon satisfactory completion of all requirements, you will be recommended to receive a California teaching credential.

Applications and filing deadlines should be obtained from the Division of Education or from the Department of Agronomy (agricultural education).

The teacher education program is also available to upper division students who have a 3.3 GPA and room in their schedule for a full-time teaching program. Satisfactory completion of your degree and the credential program would entitle you to a nonrenewable **preliminary** credential. Within five years you must complete a graduate year of study to be eligible for an additional credential. Specific requirements may be obtained from the Student Services staff in the Division of Education.



Students considering teaching as a career should consult the Division of Education or the Department of Agronomy **as early as their freshman year**. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.

### **UC Davis/CSU Sacramento Collaborative Elementary Credential Program**

The Collaborative Elementary Credential Program offers accelerated course work for the CLAD or BCLAD elementary credential during the summers; the supervised field experience is completed during the academic year. This program is designed to meet the needs of emergency credential holders and working professionals who are changing careers.

### **Program in College Teaching**

Information:  
Teaching Resources Center  
17 Wellman Hall  
530-752-6050; <http://trc.ucdavis.edu/trc/grad/colteach.htm>

The Program in College Teaching provides graduate students interested in college and university teaching the opportunity to improve their teaching skills and gain familiarity with a wide range of issues important to a faculty career. The program focuses on teaching in the participant's own discipline area. Direction and instruction are predominantly provided by a faculty mentor selected by the participant. Successful participants earn a certificate of completion and an appropriate annotation is added to their university transcripts. They also have the opportunity to construct a well-developed teaching portfolio for prospective employers.

The heart of the program is co-teaching with a faculty mentor. Many participants choose UC Davis faculty members as their mentors and do their teaching on the Davis campus. Participants considering a career at a community college or at a four-year teaching college are encouraged to find faculty mentors and teaching opportunities at cooperating colleges nearby, thereby developing contacts and references at institutions similar to those at which they intend to eventually teach. Participants also complete individualized learning contracts and attend regularly scheduled "Teaching Roundtables."

The program begins in late spring quarter, lasts until the end of the following spring quarter, and is designed to fit into the student's existing schedule. The Teaching Resources Center administers this graduate student professional development program, with the support of the Office of Graduate Studies.

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*Listed in the  
National  
Register of  
Historic  
Places, Hart  
Hall was  
built in  
1927.*

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**SCHOOL OF LAW**

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## SCHOOL OF LAW

Information:  
School of Law  
530-752-6477; <http://kinghall.ucdavis.edu>

The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. In addition to the traditional professional curriculum, the School provides professional skills training in interviewing and counseling, negotiation and dispute resolution and trial practice. It also offers 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. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The 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, 227 Voorhies Hall, 752-3009.

For additional information, see the *Official Guide to U.S. Law Schools*, a publication of the Law School Admission Council in cooperation with the American Bar Association and the Association of American Law Schools. This book includes material 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 from Law Services, Box 2400, Newtown, PA 18940-0977.

### Applying for Admission

**February 1** Deadline for filing applications for admission for 1999-2000 to the School of Law

1. Request application forms and the school catalog from the Office of Admissions, School of Law, University of California, 400 Mrak Hall Drive, Davis, CA 95616-5201 or post an e-mail request to: [lawadmissions@ucdavis.edu](mailto:lawadmissions@ucdavis.edu). Return your completed application to that office, plus a \$40 nonrefundable application fee, 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 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 and will materially assist the School of Law Admissions Committee in its considerations. Applications postmarked after February 1 will be returned to the applicant.

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.

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 and December. The completed test application blank, accompanied by the required fee, should be postmarked approximately six weeks before the date of the test to ensure that you will be registered for that test date.

To obtain application forms, information about the test, specific test dates and the location of testing centers, write to: Law Services, Box 2000, 661 Penn Street, Newtown, PA 18940-0998. You can also contact Law Services via e-mail at [lsacinfo@lsac.org](mailto:lsacinfo@lsac.org). The LSAT/LSDAS Registration and Information book is also available in the Law School Admission Office and the Pre-Law Advising Office on campus.

3. Register with the LSDAS no later than December 1 by completing and mailing the registration form supplied in each LSAT/LSDAS Registration and Information book. Have a transcript from each college or university you have attended sent directly to Law Services, Box 2700, 661 Penn Street, Newtown, PA 18940-0978.

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. These letters of recommendation should be enclosed in sealed envelopes, the recommender must sign across the seal, and the letters should be submitted along with the application for admission; or they may be sent directly from the recommender, a college placement center, a career center, or a college pre-law office. 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 LSAT scores and the undergraduate grade point average (GPA). The committee seeks students of diverse backgrounds and considers economic factors, 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 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 (see below), you must make separate application to Graduate Studies 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 (no need to register with LSDAS—a copy of the report previously submitted to the school you are presently attending will suffice); 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 late 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 this school.

### **Recruitment of Underrepresented Groups**

The students and faculty of the School of Law recognize the great need for lawyers from underrepresented 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, 1420 N Street, N.W., Terrace One, Washington, D.C. 20005.

Applications for the Prelaw Summer Institute for American Indians and Alaskan Natives may be obtained from the American Indian Law Center, P.O. Box 4456-Station A, Albuquerque, NM 87196 (505-277-5462).

The Mexican-American Legal Defense and Education Fund (MALDEF) has scholarships available for Latino students who have applied to law school. Applications may be obtained by writing to MALDEF, 634 So. Spring Street, 11th Floor, Los Angeles, CA 90014 (213-629-2512, ext. 146).

### **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. 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 "Programs and Courses" section of this catalog. 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, sociol-

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*The sunken courtyard at King Hall offers a welcome change of scene for study sessions.*

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ogy, 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 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

Information:  
University Extension  
530-757-8569; 530-575-8596 (fax )  
clolla@unexmail.ucdavis.edu

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.

### Student Fees: School of Law

At the time of registration each semester, every student must pay the following fees.\*

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

|                                   | Per<br>Quarter     | Annually           |
|-----------------------------------|--------------------|--------------------|
| University Registration Fee       | \$356.50           | \$713.00           |
| Educational Fee                   | \$1,543.00         | \$3,086.00         |
| Law Student Association Fee       | \$10.00            | \$20.00            |
| Memorial Union Fee                | \$42.75            | \$85.50            |
| Student Health Services Fee       | \$48.00            | \$96.00            |
| Health Insurance**                | \$200.25           | \$400.50           |
| Student Facilities Safety Fee     | \$33.00            | \$66.00            |
| Professional School Fee           | \$3,188.00         | \$6,376.00         |
| <b>Total for Calif. residents</b> | <b>\$5,421.50</b>  | <b>\$10,843.00</b> |
| Nonresident Tuition               | \$4,692.00         | \$9,384.00         |
| <b>Total for nonresidents</b>     | <b>\$10,113.50</b> | <b>\$20,227.00</b> |

\*\* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

\* These fees apply to students admitted to the School of Law in 1998-99, 1997-98, or 1996-97.

**PELP students** are considered continuing students.

**Readmitted students** are considered new (entering) students.

### School of Law: Academic Calendar 1998-99

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

|                                  | FALL 1998               | SPRING 1999*               |
|----------------------------------|-------------------------|----------------------------|
| Introduction Week                | Mon-Fri,<br>Aug 17-21   |                            |
| Law School instruction begins    | Mon, Aug 24             | Mon, Jan 11                |
| Labor Day holiday                | Mon, Sept 7             |                            |
| Thanksgiving holiday             | Thurs-Fri,<br>Nov 26-27 |                            |
| Martin Luther King, Jr., holiday |                         | Mon, Jan 18                |
| President's Day holiday          |                         | Mon, Feb 15                |
| Spring recess                    |                         | Mon-Fri,<br>Mar 29-April 2 |
| Law School instruction ends      | Fri, Dec 4              | Fri, April 30              |
| Reading period                   | Sat-Tues.,<br>Dec 5-8   | Sat-Thurs,<br>May 1-6      |
| Law School examination period    | Wed.-Wed.,<br>Dec 9-23  | Fri-Fri,<br>May 7-21       |
| Law School Commencement          |                         | Sat, May 22                |

\*Friday, February 19 is treated as a Monday for class schedule purposes.



**GRADUATE SCHOOL  
OF MANAGEMENT**

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## GRADUATE SCHOOL OF MANAGEMENT

Information:

Graduate School of Management

106 AOB IV

530-752-7399; <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*—introductory courses in micro- and macroeconomics.

*English*—a business communications course.

*Mathematics*—an introductory course in calculus.

*Statistics*—one course in elementary statistics.

## Applying for Admission

Deadlines for filing applications for admission for 1998-99 to the School of Management:

| Application Deadline | Decision made no later than |
|----------------------|-----------------------------|
| February 1, 1999     | March 26                    |
| April 1, 1999        | May 28                      |

**Interviews are highly recommended but not required, unless the applicant has less than two years of work experience.** A completed application should be on file before scheduling an interview.

Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management, One Shields Avenue, University of California, Davis, CA 95616 or by calling 530-752-7399. Complete and return your application, with all supporting documents, by the deadlines given above. The application fee is \$40.00.

### 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. Applicants must take the GMAT no later than March to be considered for fall admission. For further information and registration forms contact: Graduate Management Admission Test, Educational Testing Service, P.O. Box 6103, Princeton, NJ 08541-6103; 609-771-7330; [www.gmat.org](http://www.gmat.org).
- Three letters of recommendation. Applicants currently enrolled in school should include one recommendation from a professor. For individuals who are out of school, recommendations from employers or business associates are acceptable.
- A writing sample and a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not required, although visits from applicants are welcomed.

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*The GSM "Briefcase Brigade" makes an appearance in the annual Picnic Day parade.*

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### International Students

Foreign students for whom English is a second language must take the Test of English as a Foreign Language (TOEFL) by March 1, and receive a score of 600 or better. To receive registration forms, write to: TOEFL, Educational Testing Service, P.O. Box 6155, Princeton, NJ 08541-6155; 609-771-7100; www.toefl.org.

International students must show proof of financial support for one academic year including tuition and living expenses.

### Criteria for Admission

The major criterion of the committee granting admission is what an applicant has to gain from, and offer to, the program. 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. Both verbal and quantitative scores on the GMAT are used to evaluate measurable general aptitude for management. Background and maturity as indicated by employment history, service and activity records, recommendations and the applicant's personal statement are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

### Program of Study

In the first year, the program offers a series of core courses that focus on all the basic disciplines of business—accounting, economics, finance, marketing, organizational behavior, decision sciences and information systems.

The second year of the program allows students to take courses in individually selected concentrations. These concentrations include accounting, agricultural management, environmental and natural resource management, finance, international management, management information systems, management science, marketing, public sector management, and technology management. Students may also design their own concentration.

Whether in  
an office or  
outdoors in  
the sun,  
students have  
ample opportunity to  
meet and talk  
with faculty.

### Student Fees:

#### Graduate School of Management

At the time of registration each quarter, every student must pay the following fees.\*

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

|                                   | Per<br>Quarter    | Annually           |
|-----------------------------------|-------------------|--------------------|
| University Registration Fee       | \$238.00          | \$713.00           |
| Educational Fee                   | \$1,029.00        | \$3,086.00         |
| Graduate Student Assoc. Fee       | \$6.50            | \$19.50            |
| Memorial Union Fee                | \$28.50           | \$85.50            |
| Student Facilities Safety Fee     | \$22.00           | \$66.00            |
| Student Health Services Fee       | \$32.00           | \$96.00            |
| Health Insurance*                 | \$133.50          | \$400.50           |
| Professional School Fee           | \$2,000.00        | \$6,000.00         |
| <b>Total for Calif. residents</b> | <b>\$3,489.50</b> | <b>\$10,466.50</b> |
| Nonresident Tuition               | \$3,128.00        | \$9,384.00         |
| <b>Total for nonresidents</b>     | <b>\$6,617.50</b> | <b>\$19,850.50</b> |

\* These fees apply to students admitted to the Graduate School of Management in 1998-99, 1997-98, or 1996-97. For students admitted in 1995-96, the Professional School Fee is \$4,000 per year, and total annual student fees for California residents are \$8,466.50 for nonresidents, \$17,850.50.

\*\* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

**PELP students** are considered continuing students.

**Readmitted students** are considered new (entering) students.

### MBA Program for Working Professionals

In addition to the above full-time program, the Graduate School of Management offers an evening MBA Program for Working Professionals.

**Application Deadline**      **Decision made no later than**  
May 15, 1999                      June 30

**Interviews are required** and may be scheduled once your application is submitted.

If you would like more information about the evening program, please contact the Graduate School of Management Admissions office at 530-752-7399.





**SCHOOL OF  
MEDICINE**



**SCHOOL OF MEDICINE**

Information:  
School of Medicine  
530-752-2717; <http://www.med.ucdavis.edu>

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 Davis campus, at the UC Davis Medical Center, Sacramento; 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 New 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 24720, Oakland, CA 94623-1720. To be acceptable for the entering class of fall 1999, the new MCAT must be taken no later than fall 1998. No scores before August 1995 will be accepted.

Applicants must also meet the following academic requirements:

- A. Must have completed at least three years of study in an accredited college or university in the United States or Canada. 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. Must have completed satisfactorily before matriculation each of the following courses:

|                                                                                                                                                                                     | Quarter<br>Units | Semester<br>Units |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|
| 1. English, 1 year or its equivalent .....                                                                                                                                          | 12               | 6                 |
| 2. Biological science, 1 year including laboratory, or its equivalent .....                                                                                                         | 15               | 8                 |
| 3. General chemistry, 1 year including laboratory, or its equivalent .....                                                                                                          | 15               | 8                 |
| 4. 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                 |
| 5. Physics, 1 year including laboratory or its equivalent.....                                                                                                                      | 12               | 8                 |
| 6. Mathematics, course work sufficient to satisfy prerequisites for integral calculus. (Course work through integral calculus is recommended) .....                                 | 6                | 4                 |

**(You will find helpful experience and knowledge gained in biochemistry, genetics and embryology.)**

- C. Must 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 and request *A Guide for Prospective Students*.

**Applying for Admission**

**November 1** Deadline for filing applications for admission for 1999-2000 to the School of Medicine

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request cards are available from the Office of Admissions, School of Medicine, University of California, One Shields Avenue, Davis, CA 95616-8661, after April 1 of each year. You may also secure this form from other AMCAS-participating medical schools or from your premedical adviser. 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.

Upon receipt of the application request form, AMCAS will send you an application for admission, together with descriptive material and instructions. 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 two letters of recommendation along with a nonrefundable application fee of \$40. Send these items directly to the Chairperson of the Admissions Committee, Office of Admissions, School of Medicine, University of California, One Shields Avenue, Davis, CA 95616-8661, and not to AMCAS. 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 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.

Applications are accepted by AMCAS between *June 1* and *November 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 93 students selected on the basis of academic achievement, academic promise and personal char-

acteristics. 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 at Post Office Drawer P, Boulder, CO 80302.

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 in good standing at approved medical schools 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 April 1 of the year of transfer. A nonrefundable application fee of \$40.00 is required. Applicants must provide medical school transcripts, and if accepted, must pass Part I of the 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. Applicants will be notified of the Admissions Committee's decision starting April 30.

### **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. Although 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 Davis offers two formal combined M.D./Ph.D. programs that trains physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care.

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 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 six 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 com-

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*Medical students volunteer at Clinica Tepati, one of several such clinics for underserved populations in the Sacramento region.*

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### Student Fees: School of Medicine

At the time of registration each quarter, every student must pay the following fees.

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

#### Students entering 1998-99

|                                  | Per<br>Quarter    | Annually           |
|----------------------------------|-------------------|--------------------|
| University Registration Fee      | \$238.00          | \$713.00           |
| Educational Fee                  | \$1,029.00        | \$3,086.00         |
| Memorial Union Fee               | \$28.50           | \$85.50            |
| Student Facilities Safety Fee    | \$22.00           | \$66.00            |
| Disability Insurance Fee*        | \$61.00           | \$61.00            |
| Student Services Health Fee      | \$32.00           | \$96.00            |
| Health Insurance**               | \$133.50          | \$400.50           |
| Professional School Fee          | \$1,792.00        | \$5,376.00         |
| <b>Total for Calif residents</b> | <b>\$3,336.00</b> | <b>\$9,884.00</b>  |
| Nonresident Tuition              | \$3,128.00        | \$9,384.00         |
| <b>Total for nonresidents</b>    | <b>\$6,464.00</b> | <b>\$19,268.00</b> |

\* The Disability Insurance Fee applies to medical students only (not interns, residents, or health science academics). The annual disability insurance fee of \$61.00 is assessed fall quarter.

\*\* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

#### Students previously admitted

The Professional School Fee for students previously admitted to the School of Medicine is as follows:

**1997-98:** \$5,376 per year. Total annual student fees for California residents are \$11,021.50; for non-residents, \$20,405.50.

**1996-97:** \$4,376.00 per year. Total annual student fees for California residents are \$10,021.50; for nonresidents, \$19,405.50.

**1995-96:** \$3,376.00 per year. Total annual student fees for California residents are \$9,021.50 for nonresidents, \$18,405.50.

**PELP students** are considered continuing students.

**Readmitted students** are considered new (entering) students.

petitive fellowships is awarded annually to students enrolled in the M.D./Ph.D. program.

The Sierra Health Foundation M.D./M.B.A. program is designed to attract academically outstanding students who are committed to a career in health care leadership and who want to remain in Northern California.

Selected students will embark upon a six-year course resulting in a degree in Medicine from the UC Davis School of Medicine and an MBA in Health Services Management from the UC Davis Graduate School of Management. Students receive funding for tuition and fees for the full six years of the 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 M.D./Ph.D. program, contact Ed Dagang, Office of Student Affairs, Room 126, Medical Sciences 1C, School of Medicine, University of California, One Shields Avenue, Davis, CA 95616.

**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 (see Medicine, School of, Department of Family and Community Medicine) is limited to students who are enrolled in the FNP/PA program.

#### Academic Calendar

The School of Medicine operates on a different schedule from the rest of the campus. A detailed academic calendar may be obtained from the Office of Curricular Support, 2427 Tupper Hall, University of California, One Shields Avenue, Davis, CA 95616.

The program is a continuous four-year academic experience, with the first year commencing in fall quarter. A six-week break is scheduled between the first and second year academic schedule following spring quarter. The second year concludes with a three- to four-week period for preparation for USMLE Step 1 examination. The third and fourth year clinical experiences begin in summer and continue through spring.

With approval, students may extend the first two years over three years and use the additional time to individualize their programs. This alternative time is highly suitable for including research experiences and/or meeting other academic objectives. Flexibility in the third and fourth years also permits alternate scheduling.



**SCHOOL OF  
VETERINARY MEDICINE**

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**SCHOOL OF VETERINARY MEDICINE**

Information:  
School of Veterinary Medicine  
Office of the Dean  
Surge IV  
530-752-1383; <http://www.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 .....                    | 10            |
| Upper Division Required Sciences             |               |
| Embryology.....                              | 4             |
| Genetics .....                               | 4             |
| Biochemistry .....                           | 3             |
| Physiology.....                              | 5             |
| Required English .....                       | 12            |
| Required Humanities and Social Sciences..... | 12            |
| Required Statistics.....                     | 4             |

(To convert semester units to quarter units, multiply by  $\frac{3}{2}$ . For example, a 4-unit semester course is equivalent to a 6-unit course in the quarter system.)

You should plan your preveterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. 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) by September 30th of the year you apply for admission. Applications for the exams and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470. The GRE must be taken within five years of the time you submit your application. The highest scores will be used when the GRE is taken more than once.

**Grade Point Average.** To be considered for admission, you must have a minimum grade point average of 2.50 for both the required sciences and the cumulative grade point average. Applicants who do not meet the mini-

mum 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 should entail more than having family pets and should include experience with several animal species if that experience includes activities that gives 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 should 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, 1998** Deadline for filing applications for admission for Fall 1999 to the School of Veterinary Medicine

The Veterinary Medical Colleges Application Service (VMCAS) is the central distribution, collection and processing service for applications to the School of Veterinary Medicine and to other veterinary colleges.

Students are admitted to the School of Veterinary Medicine in the fall only. You may request an application any time after July 15 by writing to the Office of the Dean—Student Programs, School of Veterinary Medicine, University of California, One Shields Avenue, Davis, CA 95616 or by calling 530-752-1383.

Students interested in admission to the School of Veterinary Medicine are urged to request an *Announcement of the School of Veterinary Medicine* at an early date so that all minimum academic requirements and deadlines are met.

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 and advising services, write or call the Office of the Dean—Student Programs (530-752-1383).

**Letters of Evaluation.** Three letters of evaluation are required and are submitted with your VMCAS application. 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 Admission Committee to obtain additional information. The Dean and Admission 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 Legal Analyst—Residence Matters, 111 Franklin St., 8th Floor, Oakland, CA 94607-5206. 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:

1. GPA of all undergraduate and graduate course work
2. GPA of required science course work
3. GPA of last two years of college work (minimum of 45 semester units)

#### B. Graduate Record Examination:

1. General Aptitude Test (Verbal, Quantitative and Analytical)

### II. Non-Academic Factors (40-50%)

#### A. Narrative (5-20%)

#### B. Letters of Evaluation (5-20%)

#### C. Interviews (0-20%)

Applicants will also be evaluated for their understanding of the profession and the responsibilities of being a veterinarian, interest in serving the public, maturity, motivation and other qualities necessary 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 12 quarters of 12 weeks each (the last six quarters must have been spent in the School of Veterinary Medicine, University of California, Davis). A grade point average of 2.0 (C), computed on all courses taken 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 Admissions Committee, M.P.V.M. program. Application deadline for August admission is March 15. International applicants are encouraged to apply as early as possible.

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. Students who intend to complete the program in one calendar year must begin the program in August. Candidates for the M.P.V.M. degree must satisfactorily complete a total of 40 units of course work while in residence. This includes 27 units of required courses in epidemiology, biostatistics, information management and a minimum of 13 units of approved electives. 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.

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*For 50 years,  
the veteri-  
nary school  
has been  
training stu-  
dents to care  
for every-  
thing from  
horses to  
parrots.*

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**Combined Program.** Students may enroll in the combined D.V.M./M.P.V.M. program in which the M.P.V.M. degree may be awarded by the end of the fall quarter of the fifth year or as soon thereafter as all requirements for both the D.V.M. and M.P.V.M. degrees are completed, allowing students to complete the M.P.V.M. program within six months after normal completion time of the D.V.M. degree, rather than 15 months, as would be the case if taken sequentially.

**Master of Science and Doctor of Philosophy.** General information regarding these degrees will 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.

### School of Veterinary Medicine Academic Calendar 1998-99

#### FALL QUARTER 1998

|                                                            |                                   |
|------------------------------------------------------------|-----------------------------------|
| Orientation for 4th-year students                          | Fri., September 4                 |
| Instruction begins for 4th-year students                   | Tues., September 8                |
| Orientation for 1st-year students                          | Wed. and Fri.,<br>Sept. 16 and 18 |
| Instruction begins for 1st-, 2nd- and<br>3rd-year students | Mon., September 21                |
| Thanksgiving Holiday                                       | Thur.-Fri., Nov. 26-27            |
| Instruction ends                                           | Fri., December 11                 |
| Finals end                                                 | Fri., December 18                 |

#### WINTER QUARTER 1999

|                                                            |                   |
|------------------------------------------------------------|-------------------|
| Instruction begins for 4th-year students                   | Mon., January 4   |
| Instruction begins for 1st-, 2nd- and<br>3rd-year students | Mon., January 4   |
| M. L. King Holiday                                         | Mon., January 18  |
| President's Holiday                                        | Mon., February 15 |
| Monday classes meet                                        | Wed., March 17    |
| Instruction ends                                           | Wed., March 19    |
| Finals end                                                 | Friday, March 26  |

#### SPRING QUARTER 1999

|                         |                 |
|-------------------------|-----------------|
| Instruction begins      | Mon., April 5   |
| Student Awards Ceremony | Wed., May 5     |
| Memorial Day Holiday    | Mon., May 31    |
| Instruction ends        | Friday, June 11 |
| Finals end              | Friday, June 18 |
| Commencement            | Friday, June 18 |

### Student Fees: School of Veterinary Medicine

At the time of registration each quarter, every student must pay the following fees.\*

*These are the proposed fees for the 1998-99 academic year. Because fees are subject to gubernatorial, legislative and regental action, these fees may change without notice.*

|                                   | Per<br>Quarter    | Annually           |
|-----------------------------------|-------------------|--------------------|
| University Registration Fee       | \$238.00          | \$713.00           |
| Educational Fee                   | \$1,029.00        | \$3,086.00         |
| Memorial Union Fee                | \$28.50           | \$85.50            |
| Student Health Services Fee       | \$32.00           | \$96.00            |
| Health Insurance**                | \$133.50          | \$400.50           |
| Student Facilities Safety Fee     | \$22.00           | \$66.00            |
| Professional School Fee†          | \$1,334.00        | \$4,000.00         |
| <b>Total for Calif. residents</b> | <b>\$2,817.00</b> | <b>\$8,447.00</b>  |
| Non-Resident Tuition              | \$3,128.00        | \$9,384.00         |
| <b>Total for nonresidents</b>     | <b>\$5,945.00</b> | <b>\$17,831.00</b> |

\* These fees apply to students admitted to the School of Veterinary Medicine in 1998-99, 1997-98 or 1996-97. For students admitted in 1995-96, the Professional School Fee is \$3,000 per year, and total annual student fees for California residents are \$7,447.00; for nonresidents, \$16,831.00.

\*\* Students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

† M.P.V.M., Masters, and Ph.D. students do not pay the Professional School Student Fee or Course Materials Fee. These students pay the Graduate Student Fees (see Graduate Studies).

**PELP students** are considered continuing students.

**Readmitted students** are considered new (entering) students.

*Dogs need their teeth cleaned, too; the veterinary school trains doggie dentists to take care of canine canines.*



**PROGRAMS  
& COURSES**

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**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 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.

- **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 on their course numbers, e.g., 13AT, 141AT.

**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 variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

**Professional Courses for Teachers and Nurse Practitioners**

Courses **numbered 300–399** are teacher-training courses in the Division of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. Also included are courses for certification of family nurse practitioners and physician assistants. 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.

**COURSE DESCRIPTIONS**

Here is a sample of how a course is listed in this catalog.

**190. Proseminar in Nutrition** (1) I, II, III. The Staff 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 for credit with consent of instructor. (P/NP grading only.)

**Top line:** course number; title; units; quarters offered; instructor(s).

**Paragraph following:** course instructional format; prerequisite; course description; grading if other than letter grading.

**Quarters offered:** 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



**Alternate Year Designation**

Some course descriptions will include the phrase “Offered in alternate years.” If the course number is marked with an asterisk (\*), this indicates that the course *will not* be offered this academic year, but will be offered the following year. If the course number is not marked with an asterisk, this indicates that the course *will* be offered this academic year, but will not be offered the following year.

**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**

You may find that, because of space limitations, the descriptions in the *General Catalog* will 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 course goals, 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 Shields Library Reference and Periodicals desks, the College deans’ offices, advisers’ offices, advising centers, departmental offices, and at The First Resort.

**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 *Class Schedule and Room Directory*, available in the UCD Bookstore.**



## African American and African Studies

(College of Letters and Science)

Patricia A. Turner, Ph.D., Director

Program Office, 2201 Hart Hall (530-752-1548)

World Wide Web: <http://cougar.ucdavis.edu/aas>

### Committee in Charge

Moradewun Adejunmobi, Ph.D. (*African American and African Studies*)

Bobbie J. Bolden, M.A. (*African American and African Studies, Dramatic Art*)

Cynthia Brantley, Ph.D. (*History*)

Carl C. Jorgensen, Ph.D. (*Sociology*)

Jacob K. Olupona, Ph.D. (*African American and African Studies*)

Melvin Ramey, Ph.D. (*Civil and Environmental Engineering*)

Ella Ray, Ph.D. (*African American and African Studies*)

Belinda Robnett, Ph.D. (*Sociology*)

John H. Stanfield, II, Ph.D. (*African American and African Studies, Sociology*)

John O. Stewart, Ph.D. (*African American and African Studies*)

Patricia A. Turner, Ph.D. (*African American and African Studies*)

### Faculty

Moradewun Adejunmobi, Ph.D., Assistant Professor

Bobbie J. Bolden, M.A., Lecturer

Jacob K. Olupona, Ph.D., Professor

Ella Ray, Ph.D., Assistant Professor

John H. Stanfield, II, Ph.D., Professor

John O. Stewart, Ph.D., Professor

Patricia A. Turner, Ph.D., Associate Professor

### Affiliated Faculty

Kristee Haggins, Ph.D., Adjunct Assistant Professor

## The Major Program

The African American and African Studies Program provides courses on the history and culture of African Americans. The program provides students with a multi-disciplinary learning experience. Students in the major take 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 programs.

**The Program.** Students are encouraged to combine an examination of African American history and culture in the U.S.A. with African or diaspora studies. The emphasis in African American (U.S.A.) culture includes courses on the history, culture, arts, and literature of African Americans, the patterns of their socio-political and cultural movements, and the struggle with racism as a social and psychological problem. The emphasis in African Studies focuses on the social organization, culture, and religion of West African societies. The diaspora emphasis includes courses on the African heritage in the Americas, Islam in Africa and the Americas, African religion in the diaspora and cinema studies. In addition, students may choose to do special research projects.

**Career Alternatives.** Students completing the African American and African Studies major are well prepared for employment in the Office of Education, human service units, county social service programs, and counseling services. The major is also an appropriate background for work in community organizations like the Urban League, NAACP, Urban Affairs, and Office of Economic Opportunity, or future study in graduate school.

## 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 .....36

African American and African Studies 10...4

Two courses from Anthropology 2; Economics

1A, 1B; Geography 2; Sociology 1; Political

Science 1, 2; Psychology 1.....8

Two courses from Chicana/o Studies 10;

Native American Studies 1, 10; American

Studies 45; Asian American Studies 1, 2

.....8

Two courses from History 17A, 17B, 17C...8

Music 28.....4

One course from Statistics 13, Sociology 46A,

or Psychology 41 .....4

**Depth Subject Matter .....36**

African American and African Studies 101,

110, 133.....12

A coordinated program of upper division

courses, selected and approved in con-

sultation with the major advisers and chosen

to reflect the student's major

emphasis.....24

(These areas of emphasis are offered as

guidelines for students in the major. They

are not the only areas students may

choose for the major.)

*Culture of African American emphasis:*

African American and African Studies

107A, 107B, 153; Anthropology 140A,

140B; History 177A, 177B; Political Sci-

ence 167.

*African emphasis:* African American and

African Studies 110, 162, 171; Anthropol-

ogy 140A, 140B; History 115A, 116;

Political Science 134, 146.

**Total Units for the Major .....72**

**Major Adviser.** E.M. Ray.

## Minor Program Requirements:

UNITS

### African American and African Studies.....24

Select one course from African American and

African Studies 10, 15, or 80.....4

Select five courses from African American

and African Studies 100, 101, 107A, 110,

123, 133, 141, 145A, 145B, 151, 152,

153, 160, 162, 170 .....20

**American History and Institutions.** This University requirement can be satisfied by completion of African American Studies 10, 100. (See also under University requirements.)

### Related Upper Division Courses

The following courses are offered by faculty members in other disciplines and focus on African and African American people and their culture.

Anthropology 104, 139A, 139B, 140, 153; Art History

150; Community and Regional Development 151,

152, 153, 159A, 159B, 172; Dramatic Art 155; Educa-

tion 150; English 179, 181; Geology 125A, 125B; History

102, 115A, 115B, 115C, 116, 177; Music 113B;

Political Science 134, 138, 146, 151, 167, 176; Sociol-

ogy 129, 130.

## Courses in African American and African Studies (AAS)

### Lower Division Courses

#### 10. Introduction to Afro-American Culture and Society (4) I. Turner

Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political and social and economic factors that have affected the development and status of Afro-American people.

#### 12. Introduction to African Studies (4) II.

Olupona, Adejunmobi

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.

#### 15. Introduction to African American Humanities (4) I. Ray, Stewart

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.

#### 16. Verbal and Performance Arts in Africa (4) II.

Adejunmobi, Ray

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.

#### 17. Women in African Societies (4) I.

Adejunmobi

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.

#### 50. Black Images in Popular Culture (4) III.

Turner

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.

#### 51. History of Afro-American Dance (4) III.

Wynn-Bolden

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.

#### 52. African Traditional Religion (4) II. Olupona

Lecture—2 hours; discussion—2 hours. Introduction to the 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 such as sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: ArtHum, Div, Wrt.

#### 54. University Gospel Choir (2) I, II, III. Lymus,

Stewart

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 54.) (P/NP grading only.)

#### 80. Introduction to Black Politics (4) III.

The Staff

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.

#### 99. Special Study for Undergraduates (1-5) I, II,

III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 100. Survey of Ethnicity in the U.S. (4) II. Turner

Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the groups themselves. GE credit: ArtHum, Div.

**101. Introduction to Research in the****Afro-American Community (4) III.** The Staff

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.

**107A. African Descent Communities and Culture in the Caribbean and Latin America (4)**

I. Stewart, Ray

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.

**107B. African Descent Communities and Culture in North America (4) I.** Stewart, Ray

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.

**107C. African Descent Communities and Culture in Europe and Asia (4) I.** Stewart, Ray

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.

**110. West African Social Organization (4) II.**

Olupona, Adejunmobi

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.

**111. Cultural Politics in Contemporary Africa (4) II.** Adejunmobi

Adejunmobi

Lecture/discussion—4 hours. Prerequisite: upper division standing or course 12. Themes and style of new cultural forms in Africa as displayed in art, music, film and writing, especially in regard to blending of indigenous and foreign influences. Social and political forces shaping contemporary cultural expression. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**123. The Black Female Experience in Contemporary Society (4) III.** Ray

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.

**130. Education in the African American Community (4) I.** The Staff

The Staff

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.)

**133. The Black Family in America (4) III.** Ray

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of social science research to examine relationship between Black family structures, patterns of functioning, and political, economic, and social conditions. Examination of role differentiation within families by race and social class. GE credit: SocSci, Div.

**141. Psychology of the African American Experience (3) III.** Haggins

Haggins

Lecture—2 hours; discussion—1 hour. Prerequisite: course 10 or consent of instructor. Introduction to the psychological issues faced by African Americans. Analysis of issues from European/Western and Afro-centric frame of reference. Emphasis on Optimal Theory, a psychological theory based on an Afrocentric world view.

**145A. Black Social and Political Thought (4) III.** The Staff

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.

**145B. Black Intellectuals (4) III.** The Staff

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.

**\*150A. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) I.** The Staff

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.

**\*150B. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) II.** The Staff

Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to present. GE credit: ArtHum, Div.

**151. Afro-American Vernacular Music and Verbal Arts (4) III.** Turner

Turner

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.

**152. Major Voices in Black World Literature (4) II.** Stewart

Stewart

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 the discovery of literature as a cultural resource. GE credit: ArtHum, Div, Wrt.

**154. University Gospel Choir (2) I, II, III.** Lymus, Stewart

Lymus, Stewart

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.)

**155A. African American Dance and Culture in the United States, Brazil and the Caribbean (4) II.** Bolden

Bolden

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.)

**156. Language and Identity in Africa and the African Diaspora (4) III.** Adejunmobi

Adejunmobi

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.

**157. Literature and Society in South Africa (4) III.** Adejunmobi

Adejunmobi

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 of context of writing. Offered in alternate years. GE credit: Div, Wrt.

**160. African American Folklore (4) III.** Turner

Turner

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.

**162. Islam in Africa and the Americas (4) III.** Olupona

Olupona

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.

**163. African Religions in the Americas (4) III.** Olupona

Olupona

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.

**170. African American Film and Video (4) II.** Ray and staff

Ray and staff

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.

**171. Black African and Black European Film and Video (4) III.** Ray and staff

Ray and staff

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 dramatic films and videos that treat black life in Africa and Europe. Critical attention will focus on the imaginative construction of ethnicity, race, nationality, gender, and sexuality in each particular work. GE credit: ArtHum, Div.

**190. Topics in African and African-Diaspora Studies (4) III.** The Staff

The Staff

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 once for credit when topic differs.

**192. Internship in African American and African Studies (1-8) I, II, III.** The Staff

The Staff

(Chairperson in charge)

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) I, II, III.** The Staff

The Staff

(Chairperson in charge)

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 6 units. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff

The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff

The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)



## Agricultural and Environmental Chemistry (A Graduate Group)

David S. Reid, Ph.D., Chairperson of the Group  
Group Office, 111 Cruess Hall (530-752-1415)

**Faculty.** Includes members from various departments in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the Schools of Medicine and Veterinary Medicine.

**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 by writing the Group Chairperson.

**Graduate Advisers:** D.O. Adams (*Viticulture and Enology*), C.F. Shoemaker (*Food Science and Technology*), Y.-L. Hsieh (*Textiles and Clothing*), T. Shibamoto (*Environmental Toxicology*), R.J. Zasoski (*Land, Air, and Water Resources*).

### Courses in Agricultural and Environmental Chemistry (AGC)

#### Graduate Courses

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)  
Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)

**\*298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III, summer. The Staff (Chairperson in charge)  
Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

## Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

### The Major Program

The major in agricultural and managerial economics teaches students to apply economics and quantitative principles to problems in agricultural production, management, and marketing.

**The Program.** Each student must specialize in at least one of three options: agricultural economics, which focuses on topics related to the production and marketing of foods and fibers; environmental and resource economics, which focuses on issues related to use of resources and environmental quality; or managerial economics, which focuses on topics related to evaluating, financing, and managing business activities.

**Internships and Career Alternatives.** Students in agricultural and 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 farm and ranch production, food and agricultural processing, agricultural sales and service, banking, finance, commodity and stock brokerages in the private sector, 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 economics, economics, business administration, or law.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

#### UNITS

**English Composition Requirement.....4-12**  
See College requirement .....0-8  
Additional English (English 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, or 104E) ...3-4

**Preparatory Subject Matter .....65-68**  
Accounting (Management 11A-11B) .....8  
Computer Science (Agricultural Systems and Environment 21, Computer Science Engineering 10, 15 or 30, Engineering 5)...3-4  
Economic principles (Economics 1A-1B)...10  
Calculus (Mathematics 16A-16B or 21A-21B) .....6-8  
Statistics (Statistics 13, 103) .....8  
Social Science, Natural Science, Agricultural Science .....40  
(See undergraduate handbook in Department Advising Office for complete list of courses.)

**Breadth/General Education.....6-24**  
*Note:* Approved General Education courses may be used to simultaneously satisfy Social, Natural, and Agricultural Science courses as defined in the Preparatory Subject Matter for the major and the campus General Education requirement.

**Depth Subject Matter .....19-21**  
Students graduating with this major are required to attain at least a C average (2.0) in all upper division courses taken at the University in the depth subject matter.

Micro theory, Agricultural and Resource Economics 100A, 100B .....8  
Quantitative methods, Agricultural and Resource Economics 106, 155 .....8  
Macro theory, Economics 101 or 105 .....4-5

**Restricted Electives .....32**  
Choose at least one of the options below

**Agricultural Economics** option  
Choose at least 15 units from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 145, 150. Select the remaining 13 units from the aforementioned courses, Agricultural and Resource Economics 18, or upper division courses in Agricultural and Resource Economics and/or Economics.

**Environmental and Resource Economics** option  
Agricultural and Resource Economics 175, 176.

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 8 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.

**Managerial Economics** option  
Agricultural and Resource Economics 18.  
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 120, 130, 132, 138, 139, 140, 143, 144, 145, 146, 150, 156, 175, 176, 194HA-194HB, Economics 121A, 121B, 151A, 151B, 160A, 160B, Political Science 174, 188.

**Unrestricted Electives .....37-48**  
**Total Units for the Degree.....180**

**Advising Center** for the major is in 1176 Social Sciences and Humanities Building (530-752-6185).

**Major Adviser.** R. Green (*Agricultural and Resource Economics*).

### Minor Program Requirements:

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 Agricultural and 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 are not accepted for any emphasis.

#### UNITS

#### Agricultural and 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 the Graduate Studies section in this catalog.

# Agricultural and Resource Economics

(College of Agricultural and Environmental Sciences)

Colin A. Carter, Ph.D., Chairperson of the Department

Department Office, 2118 Social Sciences and Humanities Building (530-752-1517)

Undergraduate Student Information, 1176 Social Sciences and Humanities Building (530-752-6185)

Graduate Student Information, 1171 Social Sciences and Humanities Building (530-752-6886)

World Wide Web: <http://www.agecon.ucdavis.edu/>

## Faculty

Richard Alcauskas, J.D., Lecturer  
Julian M. Alston, Ph.D., Professor  
Steven Blank, Ph.D., Lecturer  
Bayford D. Butler, M.S., Lecturer  
Leslie J. Butler, Ph.D., Lecturer  
Michael R. Caputo, Ph.D., Professor  
Hoy F. Carman, Ph.D., Professor  
Colin A. Carter, Ph.D., Professor  
James A. Chalfant, Ph.D., Professor  
Roberta L. Cook, Ph.D., Lecturer  
James Faber, M.S. Lecturer  
Y. Hossein Farzin, Ph.D., Assistant Professor  
Rachel Goodhue, Ph.D., Assistant Professor  
Richard D. Green, Ph.D., Professor  
Arthur Havenner, Ph.D., Professor  
Thomas W. Hazlett, Ph.D., Professor  
Dale M. Heien, Ph.D., Professor  
Garth J. Holloway, Ph.D., Assistant Professor  
Richard E. Howitt, Ph.D., Professor  
Lovell S. Jarvis, Ph.D., Professor  
Desmond A. Jolly, Ph.D., Lecturer  
Karen Klonsky, Ph.D., Lecturer  
Mahlon Lang, Ph.D., Lecturer  
Douglas M. Larson, Ph.D., Associate Professor  
Philip L. Martin, Ph.D., Professor  
Catherine J. Morrison, Ph.D., Professor  
Quirino Paris, Ph.D., Professor  
Scott Rozelle, Ph.D., Associate Professor  
Richard J. Sexton, Ph.D., Professor  
Lawrence E. Shepard, Ph.D., Senior Lecturer  
Joe J. Stasulat, Ph.D., Lecturer  
Daniel A. Sumner, Ph.D., Professor  
J. Edward Taylor, Ph.D., Professor  
James E. Wilen, Ph.D., Professor  
Jeffrey Williams, Ph.D., Professor

## Emeriti Faculty

Oscar R. Burt, Ph.D., Professor Emeritus  
Harold O. Carter, Ph.D., Professor Emeritus  
Jerry Foytik, Ph.D., Professor Emeritus  
Benjamin C. French, Ph.D., Professor Emeritus  
Varden Fuller, 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  
J. Herbert Snyder, Ph.D., Professor Emeritus  
Stephen H. Sosnick, Ph.D., Professor Emeritus

**Major Program and Graduate Study.** See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Studies chapter in this catalog.

**Major Advisers.** See the *Class Schedule and Room Directory*.

**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.

#### 15. Population, Environment and World Agriculture (4) I. Jarvis

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: SocSci, Div, Wrt.

#### 18. Business Law (4) I, III. Alcauskas; summer. The Staff

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.

#### \*49A-49B-49C. Field Practice (1) I, II, III.

Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and management and their application in agricultural production. (P/NP grading only.)

#### 98. Directed Group Study

(1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in Charge) Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 100A. Intermediate Microeconomics: Theory of Production and Consumption (4) I. Holloway, Holloway; II. Carman; III. Farzin

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.)

#### 100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) I. Martin; II. Sexton; III. Caputo

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

#### 106. Quantitative Methods in Agricultural Economics (4) I. Green; II. Taylor; III. Chalfant

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.

#### 112. Fundamentals of Business Organization (4) I. Butler; III. Faber; summer. The Staff

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.

#### 113. Fundamentals of Marketing Management (4) I. Butler

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) I. Rozelle; II. The Staff

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: SocSci, Div.

#### 115B. Economic Development (4) III. Woo (Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 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 Economics 115B.) GE credit: SocSci.

#### 118. Tax Management (4) III. Butler

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) II. Sumner

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.

#### 130. Agricultural Markets (4) III. L. Butler

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.

#### 132. Cooperative Business Enterprises (3) I. Lang

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.

#### 136. Managerial Marketing (4) II. Carman

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.

#### 138. International Commodity and Resource Markets (3) III. Williams

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.



**139. Futures and Options Markets** (3) I. Carter  
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.

**140. Farm Management** (5) II. The Staff  
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) I. Shepard; II. Butler; summer. The Staff  
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.

**143. Investments** (3) II. Shepard  
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.

**144. Real Estate Economics** (3) III. Shepard  
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, multi-family, industrial and office real estate markets.

**145. Farm and Rural Resources Appraisal** (4) III. Johnston  
Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation. Real estate instruments and elements of real estate finance.

**146. Government Regulation of Business** (3) II. Goodhue  
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.

**147. Resource and Environmental Policy Analysis** (3) II. The Staff  
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) II. The Staff  
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) I. Martin  
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.

**155. Quantitative Analysis for Business Decisions** (4) I, II. The Staff; III. Howitt  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected top-

ics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and others.

**156. Introduction to Mathematical Economics** (4) I. Holloway  
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.

**157. Analysis for Production Management** (4) III. Carman  
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.

**171A. Financial Management of the Firm** (4) I. The Staff  
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. (Students who have had or are taking Economics 134 may not receive credit for this course.)

**171B. Financial Management of the Firm** (4) II. The Staff  
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.

**175. Natural Resource Economics** (3) III. Farzin  
Lecture—3 hours. 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.

**176. Environmental Economics** (3) II. Larson  
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Analytical treatment of the 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.

**192. Internship** (1-6) I, II, III, summer. The Staff (Chairperson in charge)  
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** (3-3) I-II. Martin  
Independent study—2 hours; seminar—1 hour. Prerequisite: course 100B; 106 or 155. The remaining course (106 or 155), if any, may be taken concurrently with 194HB. Open to seniors majoring in Agricultural and Managerial Economics with a minimum GPA of 3.50. 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 Agricultural Economics** (1-3) I, II, III. The Staff (Chairperson in charge)  
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 discus-

sion 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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

## Graduate Courses

**200A. Microeconomic Theory** (5) I. The Staff (Economics)  
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.)

**200B. Microeconomic Theory** (5) II. Helms (Economics)  
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.)

**200C. Microeconomic Theory** (5) III. Makowski (Economics)  
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.)

**202A. Introduction to Applied Research Methods** (3) I. Taylor  
Lecture/discussion—3 hours. Prerequisite: courses 204 and 256, or the equivalent; 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.

**202B. Applied Microeconomics I: Consumer and Producer Behavior** (3) II. Morrison  
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.

**202C. Applied Microeconomics II: Welfare Analysis and Imperfect Competition** (3) III. Goodhue  
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.

**204. Microeconomic Analysis** (5) I. Sexton  
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or courses 100A-100B and Mathematics 16A-16B; open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Economics 204.)

**214. Development Economics** (4) I. Rozelle (in charge), Jarvis, Taylor  
Lecture—4 hours. Prerequisite: course 100A, 100B, Economics 101; course 204 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.)

**215A. Agriculture and Economic Development** (4) I. Taylor (in charge), Jarvis, Rozelle  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A or 204 and 214. Agricultural development theory and application. Analysis of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household-farm and intersectoral models. (Same course as Economics 215A.)

**215B. Open Macroeconomics of Development** (4) II. Kaneda (Economics)  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 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 Economics 215B.)

**\*215C. Empirical Approaches to Development Analysis** (4) III.  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 215A, 215B. Extension of development models for policy analysis including Household-Farm models, models of resource allocation under uncertainty. Social Accounting Matrix and Computable General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income-distribution weights. (Same course as Economics 215C.)

**\*215D. Environment and Economic Development** (4) III. Farzin  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 204 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.)

**221. Agricultural Policy in Developed Countries** (4) II. Sumner  
Lecture/discussion—4 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

**\*222. International Agricultural Trade and Policy** (3) II. Carter  
Lecture—3 hours. Prerequisite: course 100B or 204; 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. Offered in alternate years.

**240A. Econometric Methods** (4) II. Green  
Lecture—4 hours. 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.)

**240B. Econometric Methods** (4) III. Chalfant  
Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regression, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Economics 240B.)

**240C. Econometric Theory** (4) I. The Staff (Economics)  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Economics 240C.)

**240D. Topics in Econometrics** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Economics 240D.)

**252. Applied Linear Programming** (4) II. Howitt  
Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions: production, diet, blending, network and related problems.

**253. Optimization Techniques with Economic Applications** (4) I. Williams  
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) II. Caputo  
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.

**255. Advanced Topics in Economic Dynamics** (3) III. Caputo, Howitt  
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) II. Heien  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106, Economics 140 or the 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.)

**\*257. Analysis and Applications in Production Economics** (4) III. The Staff  
Lecture—4 hours. Prerequisite: courses 204, 252, and 256 or the equivalent. Micro-level analysis of decision problems in agricultural production processes, e.g., investment, resource conservation, pest management, and irrigation scheduling. Covers static and dynamic models under risk and uncertainty and some aggregate aspects of production.

**258. Demand and Market Analysis** (3) III. Morrison  
Lecture—3 hours. Prerequisite: courses 204 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.

**\*261. Case Problems in Management** (3) II.  
Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing, and financing issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculturally oriented firms.

**275. Resource and Environmental Economics of Agriculture** (3) III. Weinberg  
Lecture/discussion—3 hours. Prerequisite: course 204/Economics 204. Development of externality theory and market failure in agricultural production; use of discounting, welfare economics, and political economic models in analyzing agricultural public policies; exploration of theory of renewable and nonrenewable resources in agricultural issues.

**276. Institutional and Economic Analysis of Natural Resources** (3) I. Larson  
Lecture—2 hours; discussion—1 hour. Prerequisite: course 204/Economics 204 or consent of instructor. Natural resources are developed and allocated in a milieu of institutional arrangements that significantly affect their economic yields: definition/enforcement of property rights; information and search costs; market externalities, transactions and adjustment costs. Applications to land/water policy.

**\*280. Analysis of Research in Production Economics** (4) II.  
Lecture—3 hours; discussion—1 hour. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

**281. Analysis of Research in Agricultural Marketing** (4) III. Williams  
Lecture—4 hours. Current problems and methods in agricultural market analysis with emphasis on marketing sector firm behavior. Topics include market definition, marketing margins and derived demand, spatial markets, technology analysis, models of imperfect competition, cooperatives, and marketing orders.

**283. Analysis of Research in Natural Resource Economics** (3) III. Wilen  
Lecture—3 hours. Prerequisite: course 254. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.

**\*284. Applied Demand Analysis** (4) I. The Staff  
Lecture—4 hours. Prerequisite: courses 200A, 240A, and 240B. Issues, techniques and methodology currently used in applied demand analysis. Demand parameter estimates will be used to answer various policy questions. Problem identification, model specification, hypothesis stipulation, and econometric estimation of various demand models.

**293. Analysis of California Agriculture and Resources** (3) III. Johnston  
Lecture—1.5 hours; fieldwork—45 hours total of field trip, 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.)

**293M. Analysis of California Agriculture and Resources** (2) III. Johnston  
Lecture—0.5 hours; fieldwork—45 hours total, including one 5-day summer field trip. Prerequisite: Ph.D. level standing. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. (S/U grading only.)

**298. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

#### Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Agricultural 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 Agronomy and Range Science.

### Minor Program Requirements:

UNITS

#### Agricultural Computing and Information Systems .....18

Two or three of the following courses: Agricultural Systems and Environment 120, 121, 122, Animal Science 128. (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 systems, statistics, and simulation:*

Agricultural and Resource Economics 106, 155, Applied Biological Systems Technology 180, Community and Regional Development 160, Computer Science Engineering 167, Statistics 141

*Communication and business organization:*

Agricultural and Resource Economics 112, Agricultural Education 171, 172, Community and Regional Development 168, Communication 103, 136

**Minor Adviser.** R.E. Plant (*Agronomy and Range Science*), J. Fadel (*Animal Science*).

**Advising Center** is located in 152 Hunt Hall (530-752-1715).

## Agricultural Education

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of Agronomy and Range Science.

**Major Program.** An undergraduate program leading to a bachelor of science degree is offered in Agricultural Systems and Environment with a specialization in Agricultural and Environmental Education.

**Advising Center** for the major is located in 152 Hunt Hall (530-752-1715).

**Teaching Credential Subject Representative.** You may make an appointment with a credential counselor and obtain a statement of the complete requirements for the credential at the Agricultural Education Program Office, 132 or 255 Hunt Hall (530-752-3040 or 4369). Since many majors in the college do not offer the minimum preparation necessary for entering the Agriculture Teaching Credential program, you should seek counseling as early as possible. See also the Teacher Education Program.

**Graduate Study.** For graduate study refer to the Graduate Studies chapter of this catalog. The Department of Human and Community Development offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the *Graduate Announcement*.

**Graduate Adviser.** L.S. Whent (*Agronomy and Range Science*).

### Courses in Agricultural Education (AED)

*Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Education Program Office, 152 Hunt Hall.*

#### Lower Division Courses

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

##### 100. Concepts in Agricultural and Environmental Education

(3) I. Zilbert  
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.

##### 160. Vocational Education

(3) II. Whent  
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.

##### \*163. Measurement and Evaluation in Teaching

(3) II. The Staff  
Lecture—3 hours. Prerequisite: elementary statistics; upper division standing. Development of selection, use and assessment of evaluation procedures for measuring cognitive, affective and psychomotor growth.

**171. Audiovisual Communications** (2) II. Zilbert  
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) III. Zilbert  
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) II. Whent  
Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

#### Professional Courses

**300. Directed Field Experience in Teaching** (2) I, III. Zilbert

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 once for credit. (P/NP grading only.)

**301. Planning for Instructional Programs** (3) II. Zilbert

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.

**302. Teaching Methods in Agricultural Education** (3) I. Whent

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) I, III. Whent  
Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the 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) I, II, III. Whent

Student teaching (corresponds with public school session). Prerequisite: acceptance into the 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.

**\*307. Teaching in Secondary Schools** (5-18) I.

The Staff  
Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)

**323. Resource Development: Agricultural Education** (3) III. Whent

Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

**390. Seminar: Issues in Agricultural Education** (2) III. Whent

Discussion/laboratory—4 hours. Prerequisite: acceptance into the Teacher Education Program and courses 306A-306B. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.)



# Agricultural Systems and Environment

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the departments of Agronomy and Range Science; Pomology; and Vegetable Crops.

## The Major Program

This major is for students who are interested in understanding agricultural systems as they relate to the environment and society. The selected courses provide an interdisciplinary background that encompasses both natural science and social science disciplines. Students acquire a core understanding of agricultural production systems as managed ecosystems, how they function, how they interact with the natural environment and how they are intimately connected with human society and social changes. In addition, students develop an area of specialization. Within each of these areas of specialization, students choose between a broad-based education and one focused in selected areas.

**The Program.** Specialization in *Sustainable Production Systems* covers food and agricultural production, agroecology, pest ecology and management, crop improvement and propagation. Students may also develop an emphasis in particular production areas, such as agronomy, environmental horticulture, pomology, vegetable crops or viticulture. The *Range and Natural Resources* specialization emphasizes the theory and practice of natural resource management in grazed ecosystems. The *Agricultural and Environmental Education* specialization provides preparation in educational foundations, planning and teaching strategies, with development of an agriculture and environment emphasis. Specialization in *Agricultural and Environmental Communication and Information* offers preparation in agricultural and environmental science, along with in-depth understanding of communication and information management.

All students gain practical experience through a combination of internships and practica. 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; consulting; private, state and federal agencies concerned with rangeland and natural resource management; Cooperative Extension; international development; teaching; agricultural and environmental journalism, information and communication services. Graduates are qualified to pursue graduate studies in the natural and social sciences, such as agroecology, environmental studies, pest management, education, business management.

## B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

|                                                                                    |             |
|------------------------------------------------------------------------------------|-------------|
| <b>Written/Oral Expression</b> .....                                               | <b>8-12</b> |
| See college English requirement .....                                              | 8           |
| Additional English requirement (English 102 or 104A, 104C, 104D, or 104E) .....    | 4           |
| <b>Perspectives on Agriculture and the Environment</b> .....                       | <b>13</b>   |
| Agriculture, nature and society (Agricultural Systems and the Environment 1) ..... | 3           |
| Botany of agricultural plants (Agricultural Systems and the Environment 2) .....   | 4           |
| Field equipment operation (Applied Biological Systems Technology 49) .....         | 2           |
| Animals and people (Animal Science 1 or 2) .....                                   | 4           |

|                                                                                                                                                                                                                                                                                                                                                                                    |                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                            | <b>41-43</b>       |
| Biological sciences (Biological Sciences 1A-1B) .....                                                                                                                                                                                                                                                                                                                              | 10                 |
| General chemistry (Chemistry 2A-2B) .....                                                                                                                                                                                                                                                                                                                                          | 10                 |
| Physics (Physics 1A-1B or Physics 7A-7B; see specializations) .....                                                                                                                                                                                                                                                                                                                | 6-8                |
| Mathematics (Mathematics 16A) .....                                                                                                                                                                                                                                                                                                                                                | 3                  |
| Computer skills (Agricultural Systems and the Environment 21) .....                                                                                                                                                                                                                                                                                                                | 3                  |
| Statistics (Agricultural Systems and the Environment 120 or Statistics 13 or 102) .....                                                                                                                                                                                                                                                                                            | 4                  |
| Economics (Economics 1A) .....                                                                                                                                                                                                                                                                                                                                                     | 5                  |
| <b>Breadth/General Education</b> .....                                                                                                                                                                                                                                                                                                                                             | <b>24</b>          |
| See General Education requirement.                                                                                                                                                                                                                                                                                                                                                 |                    |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                  | <b>17-18</b>       |
| Crop biology and ecology (Agricultural Systems and the Environment 150 or Environmental Science and Policy 100 or Plant Biology 117 or 142) .....                                                                                                                                                                                                                                  | 4                  |
| Agricultural economics (Agricultural and Resource Economics 113 or 140) .....                                                                                                                                                                                                                                                                                                      | 4-5                |
| Agriculture and the environment (Agricultural Systems and the Environment 101) .....                                                                                                                                                                                                                                                                                               | 3                  |
| Agricultural practicum (Agricultural Systems and the Environment 92, 99, 137; Applied Biological Systems Technology 145) .....                                                                                                                                                                                                                                                     | 3                  |
| Internship (Agricultural Systems and the Environment 192, 199) .....                                                                                                                                                                                                                                                                                                               | 3                  |
| Senior thesis. The Senior Honors Thesis includes two or three successive quarters of guided scientific and/or scholarly research on an agricultural and/or environmental subject of special interest to the student. With adviser approval, the senior thesis can satisfy up to 12 units of restricted electives in the major.                                                     |                    |
| <b>Area of Specialization (choose one):</b>                                                                                                                                                                                                                                                                                                                                        |                    |
| <b>Sustainable Production Systems</b> .....                                                                                                                                                                                                                                                                                                                                        | <b>53-57</b>       |
| Includes food and agricultural production, agroecology, crop improvement, propagation, and pest management. Students may choose between a broad education in sustainable agriculture or focus on one or two areas of agriculture (e.g., agricultural management, agronomy, crop improvement, environmental horticulture, pest management, pomology, vegetable crops, viticulture). |                    |
| Crop biology and ecology depth requirement must be met with Plant Biology 142.                                                                                                                                                                                                                                                                                                     |                    |
| Genetics (Plant Biology 152 or Biological Science 101) .....                                                                                                                                                                                                                                                                                                                       | 4                  |
| Organic chemistry (Chemistry 8A, 8B) .....                                                                                                                                                                                                                                                                                                                                         | 6                  |
| Pest management (Agricultural Systems and Environment 105) .....                                                                                                                                                                                                                                                                                                                   | 3                  |
| Soils (Soil Science 100) .....                                                                                                                                                                                                                                                                                                                                                     | 4                  |
| Agricultural production systems (Agricultural Systems and Environment 107, 110A, 110B, 110C, 112, 134, 135, 150, 160, 170A, 170B; Environmental Horticulture 120, 125, 130, 133; International Agricultural Development 102; Plant Biology 173, 174; Viticulture and Enology 101A, 101B, 101C, 111, 115, 116) .....                                                                | 12-16              |
| Restricted elective courses chosen with approval of the academic adviser from the following groups .....                                                                                                                                                                                                                                                                           | (minimum 24 units) |
| <i>Plant improvement and propagation</i> (Agricultural Systems and Environment 118; Plant Biology 143, 152, 153, 154, 160, 171)                                                                                                                                                                                                                                                    |                    |
| <i>Plant physiology or plant nutrition</i> (Environmental Horticulture 102; Plant Biology 111, 146, 157, 158, 172; Viticulture and Enology 110)                                                                                                                                                                                                                                    |                    |
| <i>Atmospheric, soil or water science</i> (Atmospheric Science 133; Hydrologic Science 100, 110, 124; Soil Science 107, 109, 111)                                                                                                                                                                                                                                                  |                    |
| <i>Pest ecology and management</i> (Applied Biological Systems Technology 134; Plant Biology 176, 177; Entomology 110, 135; Nematology 100; Plant Pathology 120; Viticulture and Enology 118)                                                                                                                                                                                      |                    |

|                                                                                                                                                                                                                                                                 |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <i>Agricultural economics</i> (Agricultural and Resource Economics 101A, 120, 130, 131, 147)                                                                                                                                                                    |  |
| <i>Agricultural management</i> (Agricultural and Resource Economics 100B, 140, 145, 150, 157; Applied Biological Systems Technology 147; Agricultural Systems and Environment 121; Management 100)                                                              |  |
| <i>Animal production</i> (Animal Science 41, 41L, 102, 104)                                                                                                                                                                                                     |  |
| <i>Policy, social science and ethics</i> (Agricultural and Resource Economics 147, 176; Agricultural Systems and Environment 121; Economics 123; Environmental Science and Policy 161, 175; Hydrologic Science 150; Plant Pathology 140; Political Science 107) |  |

Unrestricted Electives .....

## Range and Natural Resources .....

**54-56**  
This specialization brings together courses that provide a unified understanding of the interaction between livestock production and environmental quality in rangelands.

|                                                                                                                                                  |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Computer and quantitative skills (Agricultural Systems and Environment 121) .....                                                                | 4     |
| Soil science (Soil Science 100) .....                                                                                                            | 4     |
| Watershed management (Hydrologic Science 141) .....                                                                                              | 4     |
| Wildlife biology (Wildlife, Fish and Conservation Biology 110, 111, 120, 151) .....                                                              | 6     |
| Animal Nutrition (Animal Science 41, Nutrition 115) .....                                                                                        | 6     |
| Forage systems (Agricultural Systems and Environment 112) .....                                                                                  | 3     |
| Remote sensing/GIS (Agricultural Systems and Environment 132, Applied Biological Systems Technology 180, 182, Hydrologic Science 182, 186) ..... | 3-5   |
| Plant identification/systematics (Plant Biology 102, Agricultural Systems and Environment 131) .....                                             | 7     |
| Ecology and conservation of rangelands (Agricultural Systems and Environment 130) .....                                                          | 3     |
| Comparative ecology of grazing ecosystems (Agricultural Systems and Environment 134) .....                                                       | 3     |
| Ecology of grassland and savanna herbivores (Agricultural Systems and Environment 135) .....                                                     | 3     |
| Public lands management (Environmental Science and Policy 172) .....                                                                             | 4     |
| Unrestricted Electives .....                                                                                                                     | 14-23 |

## Agricultural and Environmental Education .....

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>39-43</b><br>This specialization includes preparation in educational foundations, planning and teaching strategies, and development of an agricultural and environmental science emphasis. Along with a broad preparation in the natural sciences, social sciences and agriculture, this specialization prepares the student for entry into the graduate agriculture teaching credential program, for employment in the private sector in areas of training and human resource development, for working in nonformal educational programs involving environmental education, outdoor education, 4-H and other youth organizations, and pursuing further graduate studies in the social or natural sciences. |       |
| Soil science (Soil Science 10 or 100) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3-4   |
| Concepts in agricultural and environmental education (Agricultural Education 100) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3     |
| Directed field experience in teaching (Agricultural Education 300) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2     |
| Educational foundations (Education 110, 115, 120, or 153) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 8     |
| Planning and teaching strategies (Agricultural Education 171, 301 and 302 and either 160 or 172) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 11    |
| Agricultural and environmental science emphasis .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12-15 |
| Courses to be selected in consultation with academic adviser. Students typically                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |

will select one area of agriculture to develop a strength by taking three to four courses.

Unrestricted Electives .....27-38  
Students pursuing a teaching credential in agriculture need at least 10 units of Animal Science, 8 units of Plant and Soil Science, 6 units of Agricultural Economics, 4 units of Applied Biological Systems Technology, and 4 units of Environmental Horticulture. See adviser for list of required courses.

### Agricultural and Environmental Communications and Information Management .....32-42

This specialization provides broad preparation in the agricultural and environmental sciences along with in-depth understanding of communications and information management. The option prepares individuals for careers in agricultural and environmental science journalism, newscasting, information services and industrial communications.

Soil science (Soil Science 10 or 100) .....3-4  
Professional writing (English 104A or 104C)

.....4  
Upper division internship (Agricultural Education 192) .....6-9

Information technology (Agricultural Education 171 and one course from (Agricultural Education 172, Agricultural Systems and Environment 121, 122) .....5-6

Communications and information transfer (Communication 130, 140) .....4

Agricultural and environmental communications and information emphasis .....10-15  
Courses to be selected in consultation with academic adviser. Students typically will select one area of agriculture to develop a strength by taking three to four courses.

Unrestricted Electives .....28-45

**Total Units for the Major .....180**

**Major Adviser:** R. Plant.

**Advising Center** located in 152 Hunt Hall (530-752-1715).

## Minor Program Requirements:

UNITS

### Agricultural Systems and Environment .....18

Preparatory material: Statistics 13, 32, Agricultural Systems and Environment 120 or Sociology 42B, or the equivalent.

Select one of the two following tracks:

#### Sustainable Agriculture track

Agricultural Systems and Environment 105, 150, Plant Biology 142, Soil Science 100 .....15

Minimum of three units from the following: Agricultural Systems and Environment 107, 110A, 110B, 110C, 112, 170A, 170B .....3

#### Range and Natural Resources track

Agricultural Systems and Environment 121, 130 .....7

Minimum of 11 units from the following: Agricultural Systems and Environment 131, 134, 135, 150, Environmental Science and Policy 123, 172 .....11

**Minor Advisers:** R.E. Plant (*Agronomy and Range Science*), K.J. Rice (*Agronomy and Range Science*).

**Advising Center** is located in 152 Hunt Hall.

**Honors.** The Senior Honors Thesis (Agricultural and Environmental Sciences 194H) includes two or three successive quarters of guided, scientific and/or scholarly research on an agricultural and/or environmental subject of special interest to the student.

With adviser approval the Senior Thesis can satisfy up to 12 units of restricted electives in the major.

## Courses in Agricultural Systems and Environment (ASE)

### Lower Division Courses

#### 1. Agriculture, Nature and Society (3) I.

Gradziel (Pomology)

Lecture—2 hours; discussion/laboratory—1 hour. Multiple perspectives and connections between the natural sciences, social sciences, and agriculture. Emphasis on 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.

#### 2. Botany and Physiology of Cultivated Plants (4) II. Saltveit, Marrush (Vegetable Crops)

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.

#### 7. Molecules, Risk and Public Policy (3) II.

Phillips

Lecture—3 hours. Natural functions of molecules, their effects on humans, and their regulation through public policy. Students will learn about molecules that are discussed daily in newspapers. GE credit: Sci-Eng, Wrt.

#### 21. Applications of Microcomputers in

**Agriculture (3) I.** The Staff; II. Laca; III. Geng (Agronomy and Range Science)

Lecture—1.5 hours; laboratory/discussion—2 hours; autotutorial—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 Computer Science Engineering 15, 30, 35 or Engineering 5.

#### 49. Organic Crop Production Practices (3) III.

Van Horn

Lecture—1 hour; discussion—1 hour; field work—3 hours. Principles and practices of organic production of annual crops. Topics include organic crop, soil, and pest management, cover cropping, composting, seeding, transplanting, irrigation, harvesting and marketing. Includes field trip(s). (P/NP grading only.)

#### 90X. Agricultural Systems and Environment

**Seminar (1-4) I, II, III.** The Staff

Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

#### 92. Internship (1-12) I, II, III.

The Staff (Director in charge)  
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in all subject areas pertaining to agricultural and environmental sciences. Internship supervised by faculty member in the animal, plant, and environmental sciences. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III.

The Staff (Director in charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Director in charge)  
Primarily intended for lower division students. (P/NP grading only.)

### Upper Division Courses

#### 101. Agriculture and the Environment (3) II.

Hill (Agronomy and Range Science)  
Lecture—2.5 hours; Saturday field trip. Prerequisite: course 22 and consent of instructor. Focus on the interaction between agriculture and environment to address the principles required to analyze conflict and develop solutions to complex problems facing society.

#### 105. Concepts in Pest Management (3) III.

Norris (Weed Science Program)

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.

#### \*107. Small Fruit Production (2) II.

Shaw (Pomology)

Lecture—2 hours; two field trips arranged at mutual convenience. Prerequisite: Biological Sciences 1C or the equivalent. Strawberries (*Fragaria*), blackberries-raspberries (*Rubus*), blueberries-cranberries (*Vaccinium*) as important nutritional resources; their origin, production and utilization with emphasis on recent progress in integrated management. Offered in alternate years. Not open for credit to students who have taken Pomology 107. (Former course Pomology 107.)

#### 110A. Principles of Agronomic Crop Production in Temperate and Tropical Systems (3) II.

Travis, Rains (Agronomy and Range Science)

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.

#### 110B. Management of Agronomic Crops in Temperate and Tropical Systems (3) III.

Travis, Rains (Agronomy and Range Science)

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 discussed with reference to management and efficient use of physical and biological resources.

#### 110C. Crop Management Systems for

**Vegetable Production (4) I.** Mitchell, Marrush (Vegetable Crops)

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.

#### 110L. Principles of Agronomy Laboratory (1)

III. Travis, Rains (Agronomy and Range Science)  
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 Agronomy 100L. (Former course Agronomy 100L.)

#### 112. Forage Crop Ecology (3) III.

Teuber (Agronomy and Range Science)

Lecture—3 hours. Prerequisite: Biological Sciences 1C 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. Offered in alternate years. Not open for credit to students who have completed Agronomy 112. (Former course Agronomy 112.)

#### \*118. Seed Production and Quality (4) III.

Bradford (Vegetable Crops)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C; Plant Biology 152 recommended. Principles of crop seed production, storage and utilization. Biological and environmental factors influencing seed quality. Measurement and preservation of seed vigor and viability. Technological aspects of crop establishment from seeds. Laboratories include field trips to seed industry facilities. Offered in alternate years. Not open for credit to students who have completed Vegetable Crops 118. (Former course Vegetable Crops 118.)



**120. Applied Statistics in Agricultural Science**

(4) I. Geng (Agronomy and Range Science)  
Lecture—3 hours; discussion/laboratory—2 hours.  
Prerequisite: upper division standing. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretations. Not open for credit to students who have completed Agricultural Science and Management 150. GE credit: SciEng.

**121. Systems Analysis in Agriculture and Resource Management**

(4) II. Foin (Agronomy and Range Science)  
Lecture—2 hours; discussion/laboratory—2 hours.  
Prerequisite: course 21 or equivalent computer experience, and Mathematics 16A. The process of systems analysis and dynamic simulation of biological and environmental systems, use of systems analysis for development of optimal management strategies for agricultural and environmental systems. Not open for credit to students who have taken Agricultural Science and Management 121. GE credit: SciEng, Wrt.

**122. Management of Information for the Agricultural and Environmental Sciences**

(4) III. Zilbert (Agronomy and Range Science)  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 21 or consent of instructor. Introduction to systems and technology for acquiring, storing, manipulating and communicating various types of information including numerical data, text, graphics and multimedia images. Laboratory exercises introduce a wide variety of information management systems used in offices and laboratories. Not open for credit to students who have taken former course 101.

**\*130. Rangelands: Ecology, Conservation and Restoration**

(3) II. Rice (Agronomy and Range Science)  
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.

**131. Identification and Ecology of Grasses**

(2) III. Rice (Agronomy and Range Science)  
Lecture—7.5 hours; laboratory—20 hours; discussion—5 hours (total for course). 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.

**132. Geographic Information Systems in Applied Ecology**

(3) II. Plant (Agronomy and Range Science)  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 21 or the equivalent computer skills; Mathematics 16A, and course 120 or the equivalent. Introduction to GIS and its application in agriculture and resource management. Field use of global positioning systems. GIS data organization, acquisition, and analysis. Use of Arcview GIS.

**\*134. Comparative Ecology of Major Rangeland Systems**

(3) II. The Staff  
Lecture—3 hours; one Saturday field trip required. Prerequisite: course 130 or the equivalent; Environmental Studies 100 recommended. Study of vegetation structure, composition, and succession in North American rangeland communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of current rangeland management strategies. Offered in alternate years.

**135. Ecology and Community Structure of Grassland and Savannah Herbivores**

(3) I. Demment  
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B and course 2, or Biological Sciences 1C; general ecology course (Environmental Studies 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. Offered in alternate years. Former course Range Science 135.

**137. Field Course in Rangeland Monitoring and Management**

(2) III. The Staff  
Lecture—1 hour; fieldwork—3 hours (week-long intensive field course given the week following spring quarter). Prerequisite: course 2 or the equivalent, Plant Biology 102 and junior standing. Introduction to rangeland vegetation monitoring methods and management strategies. Field sampling of vegetation composition and structure, soil status, and wildlife and fish habitat. Grazing management strategies to achieve desired future condition of rangelands.

**150. Cropping Systems of the World**

(4) II. vanKessel (Agronomy and Range Science)  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 1C, and Soil Science 10. General concepts of the functioning of cropping systems as related to resource availability, energy flow, economic yield, sustainability and integration; means of increasing resource use efficiency; low and high input cropping systems in temperate and tropical zones.

**160. Agroforestry: Global and Local Perspectives**

(2) I. Weinbaum (Pomology)  
Lecture/discussion—2 hours. Prerequisite: course 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Science and Policy 100). Explores traditional and evolving use of trees in agricultural ecosystems, their multiple roles in environmental stabilization and the production of food, fuel and fiber, and socioeconomic barriers to adoption. Offered in alternate years. (Same course as International Agricultural Development 160.)

**\*170A. Fruit and Nut Cropping Systems**

(2) I. McGranahan, Ferguson (Pomology)  
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. Offered in alternate years. Not open for credit to students who have completed Pomology 170A. (Former course Pomology 170A.)

**\*170B. Fruit and Nut Cropping Systems**

(2) III. Gradziel (Pomology)  
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. Offered in alternate years. Not open for credit to students who have completed Pomology 170B. (Former course Pomology 170B.)

**188. Undergraduate Research: Proposal**

(3) III. Bloom, Yoder (Vegetable Crops)  
Lecture/discussion—3 hours. Prerequisite: consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Plant Biology 188.) (P/NP grading only.)

**189. Undergraduate Research: Experiment**

(3) I, II, III. The Staff  
Laboratory/discussion—6 hours. Prerequisite: course 188 and consent of instructor. Experimental testing of the hypothesis developed in course 188. May be repeated for a total of 12 units. (P/NP grading only.)

**190. Seminar on Alternatives in Agriculture**

(2) II. Van Horn (Agronomy and Range Science)  
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. (P/NP grading only.)

**191. Current Topics in Agricultural Science Research**

(1) I. The Staff  
Discussion—1 hour. Prerequisite: consent of instructor. Introduction to current areas of experimental investigation in the Agricultural and Plant Sciences. Seminar format with short presentations of current directions of research, followed by interactive discussions. (P/NP grading only.)

**192. Internship**

(1-12) I, II, III. The Staff (Director in charge)  
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship on and off campus in agricultural and environmental sciences. (P/NP grading only.)

**194H. Senior Honors Thesis**

(2-6) I, II, III. The Staff  
Independent study. Prerequisite: Agricultural Systems and Environment major; senior standing; overall GPA of 3.25 or higher and consent of master adviser. Two or three successive quarters of guided research on an agriculturally related subject of special interest to the student. Not open for credit to students who have completed Agrarian Studies 188H. (P/NP grading only; deferred grading only, pending completion of thesis.)

**195. Field Study of Vegetable Industry**

(1) III. Jackson, Mitchell (Vegetable Crops)  
Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research institutions, farm operations, field stations, Extension Service, marketing, processors, equipment, etc. Given between winter and spring quarters. Considered a spring course for pre-enrollment. Not open for credit to students who have completed Vegetable Crops 195. (Former course Vegetable Crops 195.) (P/NP grading only.)

**198. Directed Group Study**

(1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

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## Agronomy

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Agronomy and Range Science.

**Major Program.** See the major in Agricultural Systems and Environment.

**Graduate Study.** A program of study is offered leading to the M.S. degree in Agronomy. Information may be obtained in the Advising Office at 132 Hunt Hall. Also see the Graduate Studies chapter of this catalog.

**Graduate Adviser.** R. Plant.

**Related Courses.** Agronomy and Range Science faculty also teach the following courses that contribute to majors and graduate programs in Agriculture Teaching Credential, Agricultural Systems and Environment, Ecology, Genetics, International Agricultural Development, and Plant Biology:

Agricultural Education 100, 160, 163, 171, 172, 190, 300, 301, 302, 306A, 306B, 307, 323, 390, Agricultural Systems and Environment 21, 101, 110A, 110B, 110L, 112, 120, 121, 122, 130, 131, 134, 135, 137, 150, 190, Ecology 206, 207, Genetics 201A, 201B, International Agricultural Development 200, Plant Biology Graduate Group 220, Plant Biology 116, 142, 143, 146, 152, 161A, 161B.

## Courses in Agronomy (AGR)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 152 Hunt Hall.

### Lower Division Course

**92. Agronomy Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

### Upper Division Courses

**192. Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

**197T. Tutoring in Agronomy** (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: 6 upper division units of agronomy. (P/NP grading only.)

### Graduate Courses

**205. Experimental Design and Analysis** (4) II. Dubcovsky Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent. Graduate students in agricultural and environmental sciences will be introduced to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed course 205A. (Former course 205A.)

**206. Multivariate Systems and Modeling** (4) III. Laca Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent. Graduate students in the biological and environmental sciences will be presented multiple regression, multivariate and computer modeling methods needed to conduct research experiments and analyze multivariate data systems. Not open for credit to students who have completed course 205B. (Former course 205B.)

**207. Plant Population Biology** (3) II. Rice Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Evolution and Ecology 125, Plant Biology 117, or Entomology 104); an advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Ecology 207.)

**211. Principles and Practices of HPLC** (2) III. Goyal 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.

**\*221. Advanced Plant Breeding** (4) III. Teuber Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205; Genetics Graduate Group 201D or Animal Genetics 107; Plant Science 113. 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. Offered in alternate years.

**\*224. Chromosome Evolution** (3) I. Dvorak Lecture—3 hours. Prerequisite: Genetics 201A and 201B or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in alternate years.

**290. Seminar in Crop Growth, Production and Utilization** (1-2) I. The Staff Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food, feed and fiber crops.

**291. Seminar in Plant Breeding and Evolution of Cultivated Plants** (1-2) III. The Staff Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins and evolution of cultivated plants.

**297T. Tutoring in Agronomy** (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor; and 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 5 units. Same course may not be tutored more than one time. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Agronomy and Range Science

(College of Agricultural and Environmental Sciences)

James E. Hill, Ph.D., Chairperson of the Department  
Department Office, 133 Hunt Hall (530-752-1703)

World Wide Web: <http://agronomy.ucdavis.edu/agronomy/HOME.PG.HTM>

### Faculty

Montague W. Demment, Ph.D., Professor  
R. Ford Denison, Ph.D., Associate Professor  
Jorge Dubcovsky, Ph.D., Assistant Professor  
Jan Dvorak, Ph.D., Professor  
Shu Geng, Ph.D., Professor  
Melvin R. George, Ph.D., Lecturer  
Paul L. Gepts, Ph.D., Professor  
Sham S. Goyal, Ph.D., Lecturer  
James E. Hill, Ph.D., Lecturer  
Leland F. Jackson, Ph.D., Lecturer  
Judy A. Jernstedt, Ph.D., Associate Professor  
Stephen R. Kaffka, Ph.D., Lecturer  
Emilio A. Laca, Ph.D., Assistant Professor  
William C. Liebhardt, Ph.D., Lecturer  
John W. Menke, Ph.D., Lecturer  
Donald A. Phillips, Ph.D., Professor  
Richard E. Plant, Ph.D., Professor  
Daniel H. Putnam, Ph.D., Lecturer  
D. William Rains, Ph.D., Professor  
Kevin J. Rice, Ph.D., Associate Professor  
Kenneth W. Tate, Ph.D., Lecturer

Steven R. Temple, Ph.D., Lecturer  
Larry R. Teuber, Ph.D., Professor  
Robert L. Travis, Ph.D., Professor  
Chris vanKessel, Ph.D., Professor  
Thea A. Wilkins, Ph.D., Associate Professor

### Emeriti Faculty

Robert W. Allard, Ph.D., Professor Emeritus  
R. William Breidenbach, Ph.D., Lecturer Emeritus  
Ivan W. Buddenhagen, Ph.D., Professor Emeritus  
William J. Clawson, M.S., Lecturer Emeritus  
Beecher Crampton, M.S., Lecturer Emeritus  
Ray C. Huffaker, Ph.D., Professor Emeritus  
Subodh K. Jain, Ph.D., Professor Emeritus  
Milton B. Jones, Ph.D., Lecturer Emeritus  
Horton M. Laude, Ph.D., Professor Emeritus  
William M. Longhurst, Ph.D., Professor Emeritus  
Robert S. Loomis, Ph.D., Professor Emeritus  
Vernon L. Marble, Ph.D., Lecturer Emeritus  
Duane S. Mikkelsen, Ph.D., Professor Emeritus  
Maurice L. Peterson, Ph.D., Professor Emeritus  
Y. P. Puri, Ph.D., Lecturer Emeritus  
Calvin O. Qualset, Ph.D., Professor Emeritus  
Charles A. Raguse, Ph.D., Professor Emeritus  
Charles W. Schaller, Ph.D., Professor Emeritus  
Raymond C. Valentine, Ph.D., Professor Emeritus  
Barbara D. Webster, Ph.D., Professor Emeritus  
William A. Williams, Ph.D., Professor Emeritus

### Affiliated Faculty

Mark Van Horn, M.S., Lecturer  
Linda S. Whent, Ph.D., Lecturer, Supervisor of  
Teacher Education  
Eric E. Zilbert, Ph.D., Lecturer

**Courses.** See the Agricultural Systems and Environment, Agricultural Education, Agronomy, Plant Biology, and the Range Science course listings.

## American Studies

(College of Letters and Science)

Carole Blair, Ph.D., Program Director  
Program Office, 2201 Hart Hall (530-752-3377)  
World Wide Web: <http://cougar.ucdavis.edu/ams>

### Committee in Charge

Michael L. Smith, Ph.D. (*History*), Chairperson  
Carole Blair, Ph.D. (*American Studies*)  
Ruth Frankenberg, Ph.D. (*American Studies*)  
Susan B. Kaiser, Ph.D. (*Textiles and Clothing*)  
Jay Mechling, Ph.D. (*American Studies*)  
Judith Newton, Ph.D. (*Women's Studies*)  
Kent Ono, Ph.D. (*American Studies, Asian American Studies*)  
Patricia Turner, Ph.D. (*African American and African Studies, American Studies*)  
Jon Wagner, Ph.D. (*Education*)  
David Scofield Wilson, Ph.D. (*American Studies*)

### Faculty

Carole Blair, Ph.D., Associate Professor  
Ruth Frankenberg, Ph.D., Associate Professor  
Jay Mechling, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Kent Ono, Ph.D., Assistant Professor  
Eric Schroeder, Ph.D., Lecturer  
Patricia Turner, Ph.D., Professor

### Emeriti Faculty

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 participate in three smaller proseminars limited to majors and 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

|                                                                                                                                                                                                                                                                                                                                                               |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                       | <b>24</b> |
| One course from American Studies 1 series...                                                                                                                                                                                                                                                                                                                  | 4         |
| One course from African American and African Studies 10, Asian American Studies 1, Chicana/o Studies 10 or 20, Native American Studies 10, or Women's Studies 50 .....                                                                                                                                                                                        | 4         |
| Two courses chosen from History 17A, 17B, 72A, 72B .....                                                                                                                                                                                                                                                                                                      | 8         |
| One course chosen from English 30A, 30B ...                                                                                                                                                                                                                                                                                                                   | 4         |
| One course chosen from Anthropology 2, Sociology 2 .....                                                                                                                                                                                                                                                                                                      | 4         |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                             | <b>44</b> |
| American Studies 110, 120, 130, and 160 ...                                                                                                                                                                                                                                                                                                                   | 16        |
| American Cultural Themes, choose any two courses from the 150 series .....                                                                                                                                                                                                                                                                                    | 8         |
| Emphasis .....                                                                                                                                                                                                                                                                                                                                                | 20        |
| In consultation with an American Studies adviser, the student designs a program of 20 units of upper division course work around a unifying theme, period, or subject matter in American civilization. The course work should come from at least two disciplines. The student may choose the <b>senior thesis option</b> (190A-190B) for 8 of these 20 units. |           |

**Total Units for the Major** .....**68**

**Recommended**

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

**Minor Program Requirements:**

UNITS

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| <b>American Studies</b> .....                                        | <b>20</b> |
| American Studies, upper division courses...                          | 20        |
| No more than 8 units of course 192 may be counted toward this total. |           |

**Faculty Advisers.** C. Blair, R. Frankenberg, J. Mechling, K. Ono.

**Teaching Credential Subject Representative.** J. Mechling. See also the Teacher Education Program.

**Courses in American Studies (AMS)**

**Lower Division Courses**

**\*1A. Technology, Science, and American Culture** (4) III. Mechling

Lecture—3 hours; discussion—1 hour. American science and technology as cultural systems, mutual influence and interaction of those systems with other cultural systems, including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ArtHum or SocSci, Div, Wrt.

**1B. Religion in American Lives** (4) I.

Frankenberg

Lecture—2 hours; discussion—1 hour; tutorials and field exercises. Examines ways Americans have ordered their lives with religion; how latter-day churches, imported faiths, and Indian cultures differ or converge; attention to "civil religion" and mass-media evangelism; genres of religious experience, such as testimony, song, dance, ritual, meditation, vision, trance. GE credit: ArtHum or SocSci, Div, Wrt.

**1C. American Lives through Autobiography** (4) II. Turner

Lecture—2 hours; discussion—2 hours. 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.

**\*1E. Nature and Culture in America** (4) III.

The Staff

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.

**\*1F. The Popular Image of Women in America**

(4) II. Blair

Lecture—2 hours; discussion—1 hour; directed analysis of popular media. Lecture; media exposure; special projects. Examines the image of women as presented in popular media. Emphasis on the politics of gender roles and the connection between the popular feminine image and the demands of the larger American culture.

**\*2. Forms of American Wisdom** (2) III. Mechling

Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America: folk knowledge, popular belief, prophetic wisdom, public religion, common sense, science, literature; special attention to the grounding of wisdom in circumstance of race, gender, generation, ethnic identity, and region. (P/NP grading only.)

**\*4. Freshman Seminar** (2) II, III. The Staff

(Program Director in charge)

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.

**30. Images of America and Americans in Popular Culture** (4) I. Blair

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.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in Charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Individual Study for Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses**

**\*101A-H. Special Topics** (4) I, II, III. The Staff

(Chairperson in charge)

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 Auto-

biography; (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.

**110. A Decade in American Civilization** (4) I.

Schroeder

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. GE credit: ArtHum or SocSci, Div, Wrt.

**\*111. Theories and Practices of Everyday Life in the United States** (4) I. Ono

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status; preparatory courses for the American Studies major or the equivalent interdisciplinary experience. Introduction to the cultural studies theories and to critical practices that seek to understand everyday life in the United States, with special attention to uncovering the vernacular theories governing these practices.

**115. Living in Bodies: Body Politics in the United States** (4) II. Frankenberg

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status; preparatory courses for the American Studies major or the equivalent interdisciplinary experience. Examination of human bodies as sites for cultural constructions of identities and "selves" in the United States; attention to bodily norms, crises, and transgressions; the relation between disciplining the body and controlling social categories, including race, gender, class and sexualities.

**120. American Folklore and Folklife** (4) III.

Mechling

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.

**\*125. Corporate Cultures** (4) III. The Staff

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.

**130. American Popular Culture** (4) II. Blair

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.

**132. Critical Approaches to Media Culture** (4) II. Ono

Lecture/discussion—4 hours; film viewing—2 hours. Critical approaches to the study of contemporary media culture, focusing specifically on film, television, computer, and print media and their products and on the various interrelationships between media and U.S. culture. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.

**133. Rhetoric of Media on Social Issues** (4) III. Ono

Lecture/discussion—4 hours. An introduction to rhetorical analysis of social issues as depicted within media culture, with specific emphasis on the way media frame messages about new social problems. Not open to students who have taken Rhetoric and Communication 124 or Communication 124. Offered in alternate years. GE credit: SocSci, Div, Wrt.



**139. Feminist Cultural Studies** (4) III.

Frankenberg

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.

**\*151. American Landscapes and Places** (4) II.

Blair

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.

**\*152. The Lives of Children in America** (4) III.

Mechling

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.

**\*153. The Individual and Community in America** (4) II.

Frankenberg

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.

**154. The Lives of Men in America** (4) I.

Mechling

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.

**155. Symbols and Rituals in American Life** (4) III.

Mechling

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.

**\*156. Race, Culture and Society in the United States** (4) II.

Frankenberg

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.

**160. Undergraduate Seminar in American Studies** (4) II, III.

Schroeder, Mechling

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 once for credit when content differs.

**\*180. Junior Proseminar** (2) I, II, III.

Turner, Frankenberg

Discussion—2 hours. Prerequisite: junior standing in American Studies major. A small-group, intensive study of works frequently cited in American Studies scholarship; emphasis on theory and its application to American materials. May be repeated for credit with consent of instructor.

**190A-190B. Senior Thesis** (4-4) I.

Blair

Seminar—2 hours; independent study—2 hours. Prerequisite: senior standing in American Studies major.

In consultation with adviser, student contracts to write an extended research paper on a topic mutually agreed upon and enunciated in a prospectus reviewed and accepted by faculty. (Deferred grading only, pending completion of sequence.)

**192. Internship in American Institutions** (1-12)

I, II, III. The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and Chairperson of American Studies Program. (P/NP grading only)

**Graduate Courses****298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Anatomy

See **Anatomy, Physiology and Cell Biology: and Cell Biology and Human Anatomy (Medicine, School of)**

## Anatomy, Physiology, and Cell Biology

(School of Veterinary Medicine)

Charles G. Plopper, Ph.D., Acting Chairperson of the Department

Department Office, 1321 Haring Hall (530-752-1174)

World Wide Web:

<http://www.vetmed.ucdavis.edu/apc/anatomy.html>**Faculty**

Hilary P. Benton, Ph.D., Associate Professor

Michael L. Bruss, D.V.M., Ph.D., Professor

Leslie J. Faulkin, Jr., Ph.D., Professor

Dorothy W. Gietzen, Ph.D., Professor

Benjamin L. Hart, D.V.M., Ph.D., Professor

David E. Hinton, Ph.D., Professor

Dallas M. Hyde, Ph.D., Professor

Janine B. Kasper, D.V.M., Lecturer

K. C. Kent Lloyd, D.V.M., Ph.D., Associate Professor

Kent Pinkerton, Ph.D., Professor in Residence

Charles G. Plopper, Ph.D., Professor

Susan M. Stover, D.V.M., Ph.D., Associate Professor

Fern Tablin, V.M.D., Ph.D., Associate Professor

Reen Wu, Ph.D., Professor in Residence

**Emeriti Faculty**

George H. Cardinet III, D.V.M., Ph.D., Professor Emeritus

Donald L. Curry, Ph.D., Professor Emeritus

Alfred A. Heusner, Docteur-es-Sciences, Professor Emeritus

Walter S. Tyler, D.V.M., Ph.D., Professor Emeritus

**Affiliated Faculty**

Howard C. Bailey, Ph.D., Assistant Adjunct Professor

Jeffrey M. Cheek, Ph.D., Assistant Research

Toxicologist

Michael J. Evans, Ph.D., Visiting Professor

Gary D. Marty, D.V.M., Ph.D., Assistant Research

Pathologist

Lisa A. Miller, Ph.D., Assistant Research Cell

Biologist

Edward S. Schelegle, Ph.D., Assistant Research

Physiologist

Laura S. Van Winkle, Ph.D., Assistant Research Cell

Biologist

Barbara Washburn, Ph.D., Research Associate

## Courses in Anatomy, Physiology, and Cell Biology (APC)

**Upper Division Courses****100. Comparative Organology of Vertebrates** (4) II. Plopper

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1B. Integrative study of the organization of cells and tissues into organs and organ systems in vertebrates. The following organ systems will be compared between fish, birds, and mammals: musculoskeletal, gastrointestinal, cardiovascular, respiratory, integumentary, urinary, reproductive, and nervous.

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****202. Organology** (2) II. The Staff (Chairperson in charge)

Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in alternate years.

**205. Ultramicroscopic Anatomy** (3) III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: histology. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in alternate years.

**207. Perspectives in Morphological Research** (3) III. The Staff (Wu, Tablin in charge)

Lecture—2 hours; discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examples of specific methods include stereology, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injections. Offered in alternate years.

**215. Veterinary Histology** (6) II. The Staff (Chairperson in charge)

Lecture—3 hours; laboratory—9 hours. Prerequisite: Biological Sciences 1B. The microscopic anatomy of

tissues and organs of mammalian and avian species of veterinary significance.

### 220. Physiology and Pathophysiology of the Liver (3) I. Bruss

Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein metabolism; trace minerals; basic pathological processes; and function tests. (Same course as 420.)

### 230. The Secretory Process (2) I. The Staff (Chairperson in charge)

Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and intracellular events involved in secretion with emphasis on physiological initiators and modifiers. All secretory systems, but emphasis on the beta cell of the endocrine pancreas as role model. Offered in alternate years.

### 283. Tumor Biology (3) I. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Growth, invasion and metastasis of tumors; mechanisms of carcinogenesis; intrinsic and extrinsic etiologic factors. Offered in alternate years.

### 284. Ruminant Nutrition and Physiology (3) III. Bruss, Morris

Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systemic physiology (e.g., Neurobiology, Physiology and Behavior 110), Biochemistry (e.g., Biological Sciences 102 and 103) or the equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants. (Same as course 484.)

### 285. Morphometry of Cells, Tissues and Organs (2) III. Hyde

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent, and Statistics 13. At the end of the course, students will be able to define what critical data need to be collected to estimate volumes, surfaces and lengths of organs and their components (e.g., vessels, ducts and airways). Students will also learn how to estimate the number of cells in an organ or tissue, their volumes, products and gene expression using morphometry. Offered in alternate years.

### 290. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

### 291. Topics in Biology of Respiratory System

(1) I, II, III. Hyde, Plopper, Wu, Pinkerton  
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.)

### 292. Topics in Neuroscience Research (1) III. The Staff

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate rationale, methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neuroendocrinology, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (S/U grading only.)

### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Laboratory—6-15 hours. Prerequisite: consent of instructor.

### 299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)

## Professional Course

### 397T. Tutoring in Veterinary Anatomy, Physiology and Cell Biology (1-5) I, II, III.

The Staff  
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

## Professional Courses

**410. Equine Locomotor Anatomy (2) III. Stover**  
Lecture—10 sessions; laboratory—10 sessions. Prerequisite: Veterinary Medicine 401 with a grade of C- or better. Normal anatomy of the equine fore and hind limb bones, joints, muscles, ligaments, tendons, nerves and vessels with emphasis on clinically applicable structures.

### 420. Physiology and Pathophysiology of the Liver (3) I. Bruss

Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein metabolism; trace minerals; basic pathological processes; and function tests. (Same course as 220.)

**443. Behavior Clinic (1-2) I, II, III. Hart**  
Clinical activity—2-4 hours. Prerequisite: first-year standing in the School of Veterinary Medicine, course 458 and consent of instructor. Clinical training in behavioral therapy. Students work with clients and animal patients through the Behavioral Service Out-patient Clinic. Case record work-ups with selected presentations of cases during discussion sessions. May be repeated for credit. (S/U grading only.)

### 458. Behavioral Therapy (1) II. Hart

Lecture—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Clinical application of management, conditioning procedures, hormonal manipulation and drug therapy to resolve common behavioral problems of dogs and cats.

### 484. Ruminant Nutrition and Physiology (3) III. Bruss, Morris

Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systemic physiology (e.g., Neurobiology, Physiology and Behavior 110), biochemistry (e.g., Biological Sciences 102 and 103) or the equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants. (Same as course 284.)

## Anesthesiology

See Medicine, School of

## Animal Behavior (A Graduate Group)

Alexander H. Harcourt, Ph.D., Chairperson of the Group

Group Office, Center for Animal Behavior  
(530-752-4863; Fax: 530-752-8391;  
e-mail: jmtrevitt@ucdavis.edu)

World Wide Web:

<http://www.npb.ucdavis.edu/abggpage/abgg.htm>

**Faculty.** The Group includes faculty from 11 departments in three schools and colleges.

**Graduate Study.** The Ph.D. program in Animal Behavior is an interdepartmental program that trains students for teaching and research in a variety of areas, including anthropology, animal science, ecology, entomology, psychology, veterinary science, wildlife biology, and zoology. Students choose one of the five areas of specialization: (1) ethology and evolutionary bases of animal behavior, (2) physiological basis of animal behavior, and (3) behavior and conservation of wild animals, (4) behavior and management of domestic animals, and (5) integrative studies. All five specializations emphasize the adaptive and evolutionary bases of animal behavior. 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 early application deadline of January 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 four 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 or Entomology 104

General genetics: Biological Sciences 101

Statistics: e.g., Statistics 149 or Psychology 103, or the equivalent

Evolution: Genetics 103 or Evolution and Ecology 100, or the equivalent

Animal behavior: Neurobiology, Physiology and Behavior 102

Systemic physiology: e.g. Neurobiology, Physiology and Behavior 110 or 119

Students are encouraged to engage in some form of research as early as possible during the first year. This pre-dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

**Breadth Requirement.** The following core courses or the equivalent (22 to 24 units) are required of all students.

Interdisciplinary topics in behavior: Animal Behavior 230A

Statistical analysis: one course from Psychology 205, 207A, 207B, Statistics 206, 106, 108 or 110

Methodology and grant writing: Animal Behavior 201 Seminar in animal behavior: Animal Behavior 290

College teaching: Biological Sciences 310 or Psychology 390A, 390B, Animal Behavior 390A, 390B

Comparative psychology: Psychology 250

**Specialization.** In addition to the requirements listed above, students must also take courses in one of the three areas of specialization with substitution as approved by the adviser.

## Courses in Animal Behavior (ANB)

### Graduate Courses

#### 201. Scientific Approaches to Animal Behavior Research (3) I. The Staff

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.

#### 220. Behavioral Aspects of Animal Domestication (3) III. Price (Animal Science)

Lecture—3 hours. Prerequisite: graduate standing and a course in animal behavior, or consent of instructor. History of animal domestication, the role of natural and artificial selection in domestication, the influence of environment and experience on domestic animal behavior and human-animal interrelations. Offered in alternate years.



**230A. Interdisciplinary Approaches to Animal Behavior** (3) II. The Staff

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.

**230B. Interdisciplinary Approaches to Animal Behavior** (5) III. The Staff

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) I, II, III. Eadie, Page, Caro, Borgerhoff Mulder, Stamps

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.)

**290. Seminar in Animal Behavior** (1-3) I, II, III. The Staff

Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

Prerequisite: graduate standing and consent of instructor.

**299. Research** (1-12) I, II, III. The Staff

Prerequisite: and consent of instructor. (S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Animal Biology

(College of Agricultural and Environmental Sciences)

**Faculty.** Faculty includes members of the Departments of Animal Science; Biological and Agricultural Engineering; Entomology; Nematology; and Wildlife, Fish, and Conservation Biology.

### 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. Emphasis is on the application of these biological principals 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 organizational. 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 in consultation with their adviser. This program includes a senior thesis, which the student designs to bridge the disciplines of the major.

**Internships and Career Alternatives.** The Animal Biology major offers on-campus and off-campus internship opportunities for study at field stations, with government agencies, with private industry, and in international programs. A degree in Animal Biology prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, pest management, agriculture, conservation, environmental management, and industry. Students in the major gain research experience and may

choose to continue their training at the graduate level in a variety of biological disciplines.

## B. S. Major Requirements

|                                                                                                                                       | UNITS |
|---------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>English Composition Requirement</b> .....                                                                                          | 8     |
| See College requirement                                                                                                               |       |
| <b>Preparatory Subject Matter</b> .....                                                                                               | 69-71 |
| Biological Sciences 1A-1B-1C .....                                                                                                    | 15    |
| Chemistry 2A-2B-2C, 8A-8B or 118A-118B .....                                                                                          | 21-23 |
| Mathematics 16A-16B-16C .....                                                                                                         | 9     |
| Physics 7A-7B-7C .....                                                                                                                | 12    |
| Statistics 13 or 100 or 102 or Agricultural Systems and Environment 120 .....                                                         | 4     |
| Animal Biology 50A, 50B, 50C .....                                                                                                    | 8     |
| <b>Breadth/General Education</b> .....                                                                                                | 6-24  |
| <b>Depth Subject Matter</b> .....                                                                                                     | 26-29 |
| Molecular core: Biological Sciences 101, 102, 103 or the equivalent .....                                                             | 10    |
| Physiological core .....                                                                                                              | 6-9   |
| <i>Physiology:</i> Neurobiology, Physiology and Behavior 101 or 117 or Entomology 102 or Wildlife, Fish and Conservation Biology 121  |       |
| <i>Anatomy:</i> Anatomy, Physiology and Cell Biology 100 or Entomology 101                                                            |       |
| Evolution/ecology: Evolution and Ecology 100 or 101 or Environmental Science and Policy 121 and a course in population genetics ..... | 8     |
| Major proposal, Animal Biology (course under development) .....                                                                       | 2     |
| Senior Practicum, Animal Biology (courses under development) .....                                                                    | 6     |
| <b>Restricted Electives</b> .....                                                                                                     | 25    |
| Focused specialty as outlined in the student's proposal with approval of an advisor; 18 units must be in Divisional courses.          |       |
| <b>Unrestricted Electives</b> .....                                                                                                   | 17-40 |
| <b>Total Units for the Major</b> .....                                                                                                | 180   |

**Advising.** For information about the major, contact G.P. Moberg, Dean's Office, 234 Mrak Hall (530-752-0233).

### Courses in Animal Biology (ABI)

#### Lower Division Courses

**50A. Animal Biology Laboratory** (2) III. Granett  
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.

**50B. Animal Biology** (3) II. Page, Murray, Kaya  
Lecture—3 hours. Prerequisite: Biological Sciences 1B, course 50A. 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.

**50C. Animal Biology** (3) III. Mench, Famula, Granett  
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.

#### Upper Division Courses

**102. Animal Biochemistry and Metabolism** (4) I. Calvert  
Lecture—4 hours. Prerequisite: Chemistry 2A-2B, 8A-8B. Water and biological buffers; thermodynamics of metabolism; structure and function of biomolecules; enzyme function; kinetics; membrane biology; control of digestion and absorption; carbohydrate metab-

olism. Not open for credit to students who have completed Biological Sciences 102 or Nutrition 110.

**103. Animal Biochemistry and Metabolism** (4) I. Calvert

Lecture—4 hours. Prerequisite: course 102. Transport, physiological function and metabolism of lipids and amino acids; nutritional requirements for carbohydrates, lipids and amino acids, structure and function of vitamins; mineral metabolism. Not open for credit to students who have completed Biological Sciences 103 or Nutrition 110.

**187. Animal Biology Seminar** (2) I. The Staff  
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.

**189. Senior Practicum** (2) I, II, III. The Staff  
Independent study—6 hours. Prerequisite: junior standing, courses 50A, 50B, 50L, 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 once for credit. (P/NP grading only.)

**189D. Senior Practicum Discussion** (1) I, II, III. The Staff

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.)

## Animal Genetics

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Animal Science.

**Major Program.** See the major in Animal Science.

**Related Courses.** See Agronomy 221, 224; Plant Pathology 215X; Plant Biology 154; Vegetable Crops 220.

### Courses in Animal Genetics (ANG)

*Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 1202 Meyer Hall (530-752-6118).*

#### Upper Division Courses

**101. Animal Cytogenetics** (2) III. Delany  
Laboratory/discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 101, 102. 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.

**107. Genetics and Animal Breeding** (5) I. Medrano

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.

**108. Methods in Quantitative Animal Breeding** (3) II. Famula

Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding, including: expected value, single and multiple trait selection index, restricted selection, embedded traits, categorical traits, and best linear unbiased prediction.

**109. Introduction to Parameter Estimation** (1) II. Famula

Lecture—1 hour. Prerequisite: course 107 or the equivalent; course 108 recommended. Procedures for estimation of repeatability, heritability, and genetic and environmental correlations. Concept of expected

value, estimation of variance components and the simulation of biological data.

### 111. Molecular Biology Laboratory Techniques (4) II. Oberbauer

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Biological Sciences 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.

### 198. Directed Group Study (1-5) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

### 199. Special Study for Advanced

**Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

## Graduate Courses

**\*204. Theory of Quantitative Genetics** (3) I. Gall  
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.

### \*206. Advanced Domestic Animal Breeding (3) III. Famula

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.

### \*208. Estimation of Genetic Parameters (3) III. The Staff (Animal Science)

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) III. Murray

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.)

### 212. Sequence Analysis in Molecular Genetics (2) II. Medrano

Lecture/laboratory—2 hours. Prerequisite: Genetics 201A, 201B, 201C, or the equivalent. The use of computer algorithms and on-line databases to analyze nucleic acid and protein sequences in molecular genetics research. Offered in alternate years. (S/U grading only.)

### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.)

### 299. Research in Animal Genetics (1-12) I, II, III. The Staff (Bradford in charge)

(S/U grading only.)

## Animal Physiology

See **Animal Biology; Animal Science; Biological Sciences—Neurobiology, Physiology and Behavior; and Physiology (A Graduate Group)**

## Animal Science

(College of Agricultural and Environmental Sciences)  
Edward O. Price, Ph.D., Chairperson of the Department

James D. Murray, Ph.D., Vice Chairperson of the Department

Department Office, 2223 Meyer Hall (530-752-1250)

Undergraduate Advising, 1202 Meyer Hall (530-752-6118)

Graduate Advising, 1202 Meyer Hall (530-752-2382)

World Wide Web: <http://animalscience.ucdavis.edu>  
Bodega Marine Laboratory (707-875-2211); P.O. Box 247, Bodega Bay, CA; World Wide Web: <http://www-bml.ucdavis.edu/index.html>

### Faculty

Thomas E. Adams, Ph.D., Professor

Gary B. Anderson, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

R. Leland Baldwin, Jr., Ph.D., *Sesnon Professor of Animal Science*

Patricia J. Berger, Ph.D., Professor

C. Christopher Calvert, Ph.D., Professor

Ernest S. Chang, Ph.D., Professor (*Biological Sciences, Bodega Marine Laboratory*)

Douglas E. Conklin, Ph.D., Associate Professor

Mary E. Delany, Ph.D., Assistant Professor

Edward J. DePeters, Ph.D., Professor

Serge Doroshov, Ph.D., Professor

John M. Eadie, Ph.D., Associate Professor

James G. Fadel, Ph.D., Associate Professor

Thomas R. Famula, Ph.D., Professor

Graham A. E. Gall, Ph.D., Professor

Silas S. O. Hung, Ph.D., Professor

Annie J. King, Ph.D., Associate Professor

Kirk C. Klasing, Ph.D., Professor

Yu-Bang Lee, Ph.D., Professor

Juan F. Medrano, Ph.D., Associate Professor

Joy A. Mench, Ph.D., Professor

James R. Millam, Ph.D., Professor

Gary P. Moberg, Ph.D., Professor

James D. Murray, Ph.D., Professor

Anita M. Oberbauer, Ph.D., Associate Professor

Edward O. Price, Ph.D., Professor

Kathryn Radke, Ph.D., Associate Professor

Janet F. Roser, Ph.D., Associate Professor

Roberto D. Sainz, Ph.D., Assistant Professor

Wesley W. Weathers, Ph.D., Professor

Barry W. Wilson, Ph.D., Professor

Richard A. Zinn, Ph.D., Professor

### Emeriti Faculty

Ursula K. Abbott, Ph.D., Professor Emerita

Hans Abplanalp, Ph.D., Professor Emeritus

C. Robert Ashmore, Ph.D., Professor Emeritus

G. Eric Bradford, Ph.D., Professor Emeritus

Floyd D. Carroll, Ph.D., Professor Emeritus

Wallis H. Clark, Jr., Ph.D., Professor Emeritus

Perry T. Cupps, Ph.D., Professor Emeritus

William N. Garrett, Ph.D., Professor Emeritus

C. Richard Grau, Ph.D., Professor Emeritus

F. Howard Kratzer, Ph.D., Professor Emeritus

Robert C. Laben, Ph.D., Professor Emeritus

Glen P. Lofgreen, Ph.D., Professor Emeritus

James H. Meyer, Ph.D., Professor Emeritus,

Chancellor Emeritus

Frank X. Ogasawara, Ph.D., Professor Emeritus

Wade C. Rollins, Ph.D., Professor Emeritus

Robert W. Touchberry, Ph.D., Professor Emeritus

Pran N. Vohra, Ph.D., Professor Emeritus

William C. Weir, Ph.D., Professor Emeritus

Wilbor O. Wilson, Ph.D., Professor Emeritus

### Affiliated Faculty

Francine A. Bradley, Ph.D., Lecturer

Fred S. Conte, Ph.D., Lecturer

Ralph A. Ernst, Ph.D., Lecturer

Ian Garnett, Ph.D., Senior Lecturer

Dennis Hedgecock, Ph.D., Lecturer (*Bodega Marine Laboratory*)

Alida Morzenti, M.S., Lecturer

James W. Oltjen, Ph.D., Lecturer

Dana Van Liew, Lecturer

## The Major Program

Students in the Animal Science major develop skills and knowledge central to understanding the biological function of domestic animals and their care, management, and utilization by people for food, fiber, companionship and recreation. Domestic animals are an integral part of human societies. Advances in science and technology and an ever-growing human population have increased the complexity of issues surrounding the care and management of domestic animals. Students choose a specialization within the major that allows them to develop expertise on, and appreciation for, a particular class of animals, its functions for companionship, recreation, or in agricultural or aquacultural food production, or in laboratory research, and its influence on and contribution to the environment. Graduates from the Animal Science major will be able to advance the science and technologies of animal care and management in an objective and effective manner for the betterment of human society and domestic animals.

**The Program.** Study begins with introductory courses in animal science, biological science, chemistry, mathematics, and statistics, followed by advanced courses in animal behavior, biochemistry, genetics, nutrition, and physiology and the integration of these sciences to animal function, such as growth, lactation, and reproduction. Students complete the curriculum by choosing one of six specializations. In the *Animal Biology Discipline* specialization, students may focus on animal behavior, biochemistry, animal genetics, nutrition, or physiology. Five specializations in animal production focus on companion and captive animals, livestock and dairy production (beef, dairy, sheep, and swine), laboratory animals, horses, or aquatic animals. Students may also combine study of both a discipline area and an area of animal production within each specialization.

**Career Alternatives.** The Animal Science major prepares students for graduate study leading to the M.S. and Ph.D. degree, for professional study in medicine or veterinary medicine, and for careers in agricultural production, laboratory research, or the many related industries, including farming, ranching and animal management. Career opportunities also include positions in business, management, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research.

## B.S. Major Requirements:

UNITS

**Written and Oral Expression**.....0-8  
See College requirements

**Preparatory Subject Matter**.....56-60

Animal science (Animal Science 1, 2, 41,

41L).....12

Biological science (Biological Sciences 1A,

1B, 1C).....15

Chemistry (Chemistry 2A, 2B and 8A, 8B or

118A, 118B).....16-18

Computer science (Agricultural Systems and

Environment 21).....3

Mathematics (Mathematics 16A, 16B or 21A,

21B).....6-8

Statistics (Agricultural Systems and Environ-

ment 120 or Statistics 100).....4

Note: Some professional and graduate

schools may require additional preparatory

subject matter. Please consult the

advising center.

**Breadth/General Education**.....16-24

See General Education requirement

**Depth Subject Matter**.....36-38

Biology (Biological Sciences 101, Animal

Genetics 107, Animal Biology 102, 103,

Neurobiology, Physiology and Behavior

101, Nutrition 110).....22

Integrative animal biology (Animal Science 123, 124, and Neurobiology, Physiology and Behavior 121 and 121L) .....12  
 Laboratory course (Select one from Animal Genetics 111, Animal Science 106, 135, Molecular Biology 120L, Neurobiology Physiology and Behavior 101L) .....2-4

**Area of Specialization.....20**  
 Choose one area of specialization below; the program of study must be approved in advance by your faculty adviser.

**Animal Biology Discipline .....20**  
 Select a minimum of 12 upper division units to form a series of disciplinary courses in one of animal behavior, biochemistry, genetics, nutrition, or physiology, in consultation with your faculty adviser.  
 Select an additional 8 upper division units of animal science courses related to the chosen discipline, in consultation with your faculty adviser.

**Aquatic Animal Management .....20**  
 Animal Science 18, 131 and 136; Nutrition 124; and one of 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 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.

**Companion and Captive Animal Management .....20**  
 Animal Science 42, 142, Nutrition 123 and Veterinary Medicine 170.  
 Select additional units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, Avian Science 100, or other courses approved by your faculty adviser.

**Equine Management .....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, or other courses approved by your faculty adviser.

**Laboratory Animal Management .....20**  
 Animal Science 42, 140, Nutrition 123 and Veterinary Medicine 170.  
 Select additional units from any Animal Genetics, Animal Science course, or from Nutrition 115, 122, or other courses approved by your faculty adviser.

**Livestock and Dairy Management .....20**  
 Select two of Animal Science 143, 144 and 146; one of Animal Science 145 and 147; Nutrition 115.  
 Select additional upper division units from any Animal Genetics or Animal Science course, or from Nutrition 122, 123, or other courses approved by your faculty adviser.

**Unrestricted Electives .....30-44**  
**Total Units for Degree .....180**

**Master Adviser.** J.G. Fadel.

**Advising Center** for the major, including peer advising, is located in 1202 Meyer Hall, 530-752-6118. *Students must secure their academic adviser through this office upon entering the major.*

## 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, or 41 and 41L.....3-4  
 Animal Science 103 or 104 .....3  
 Animal Science 123, 124, or Neurobiology, Physiology and Behavior 121 and 121L .....4  
 Additional upper division courses .....9-10  
 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.

**Animal Science—Animal Genetics .....20**  
 Animal Science 15, or 41 with 41L, or 42.....4  
 Animal Genetics 107, 111 .....9  
 Additional upper division courses .....7  
 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.

**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.

**Animal Science—Dairy/Livestock .....20**  
 Animal Science 41, 41L .....4  
 Animal Science 104 .....3  
 Additional upper division courses .....13  
 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.

**Animal Science—Equine .....21**  
 Animal Science 15 .....4  
 Animal Science 103 or 104 .....3  
 Animal Science 115, 141 .....8  
 Animal Science 125 or 126 .....3  
 One additional upper division course .....3  
 Select from from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology and Behavior 121, 121L, Nutrition 115, 122, 123.

**Minor Adviser.** J.G. Fadel.

**Graduate Study.** The Department of Animal Science offers a program of study and research leading to the M.S. degree. In addition, the Master of Agriculture and Management (M.A.M.) is offered by the Department of Animal Science in conjunction with the Graduate School of Management. Detailed information about each of these programs may be obtained by contacting the Advising Center listed above.

**Graduate Adviser.** T.R. Famula (M.S. degree); I. Garrett (M.A.M. degree).

## Courses in Animal Science (ANS)

### Lower Division Courses

**1. Domestic Animals and People (4) I.** Famula  
 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.

**2. Introductory Animal Science (4) III.** Berger  
 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.

**15. Introductory Horse Husbandry (3) II.** Roser  
 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.

**18. Introductory Aquaculture (4) I.** Conklin  
 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.

**21. Livestock and Dairy Cattle Judging (2) III.** Van Liew  
 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.

**\*22A. Animal Evaluation (2) I.** Van Liew  
 Laboratory—3 hours; discussion—1 hour. Prerequisite: course 21 or the equivalent. Study of domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Accurate written and oral descriptions and occasional weekend field trips required. This course is prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)

**\*22B. Animal Evaluation (2) II.** Liew  
 Laboratory—3 hours; discussion—1 hour. Prerequisite: course 22A or the equivalent. Continuation of course 22A with emphasis on specific species: visual appraisal, carcass evaluation, and application of performance information. Accurate written and oral descriptions and occasional weekend field trips required. This course is prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)

**41. Domestic Animal Production (2) I.** DePeters  
 Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction.

**41L. Domestic Animal Production Laboratory (2) I, II.** DePeters  
 Laboratory—6 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P/NP grading only.)

**42. Introductory Companion Animal Biology (4) II.** Oberbauer  
 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.



**49. Animal Management Practices** (2) I, II, III.

Van Liew

Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management of a specific animal species. Each quarter students will be able to choose from the following sections: beef, dairy cattle, dairy goats, horses, sheep, swine, laboratory animals. May be repeated up to four times with a different species. (P/NP grading only.)

**92. Internship in Animal Science** (1-12) I, II, III.

The Staff (Department Chairperson in charge)

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 Request form must be met. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****103. Animal Welfare** (3) I. Mench

Lecture/discussion—3 hours. Prerequisite: basic course in general/animal biology (e.g., Animal Science 2 or Biological Sciences 1B or 10) and upper division standing. 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.

**104. Principles of Domestic Animal Behavior** (3) III. Price

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. Offered in alternate years. GE credit: SciEng.

**\*105. Domestic Animal Behavior** (2) II. Price

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. Offered in alternate years. GE credit: SciEng.

**\*106. Domestic Animal Behavior Laboratory** (2) II. Price

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.

**115. Advanced Horse Production** (4) I. Roser

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15; Biological Sciences 101; Nutrition 110 or 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.

**118. Fish Production** (4) II. Doroshov

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.

**\*119. Invertebrate Aquaculture** (4) III. Conklin

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) III.

Bandman (Food Science and Technology), Lee  
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) III. Lee,

Bandman (Food Science and Technology)  
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) III.

Sainz

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1B; Biological Sciences 104 and Molecular and Cellular Biology 150 recommended. 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.

**124. Lactation** (4) II. Baldwin

Lecture—3 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101; Nutrition 110; 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.

**125. Equine Exercise Physiology** (3) II. Roser

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) I. Roser

Lecture—3 hours. Prerequisite: course 15; Nutrition 110 or 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) III.

Roser

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.

**128. Agricultural Applications of Linear Programming** (4) II. Fadel

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.

**131. Reproduction and Early Development in Aquatic Animals** (4) III. Doroshov

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.

**\*135. Experimental Biochemistry Laboratory** (4) I. Calvert

Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Course designed to introduce student to concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analytical methods, cost analysis, literature review and publication writing are provided. Not open to students who have received credit for Molecular and Cellular Biology 120L.

**136. Aquatic Animal Laboratory** (2) III. Hung

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 102; basic understanding of general biology, chemistry and biochemistry. Care and maintenance of fish culture in research, production, and personal use. Students conduct an 8-week growth trial with proper experimental design, care and maintenance of fish, and data collection, interpretation and reporting.

**140. Management of Laboratory Animals** (4) I.

The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Neurobiology, Physiology and Behavior 101. Application of the concepts of nutrition, physiology, and genetics to maintenance of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.

**141. Equine Enterprise Management** (4) II.

Roser/Garnett

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.

**143. Pig and Poultry Care and Management** (4)

I. Garnett, Ernst, Berger

Lecture—3 hours; laboratory—3 hours; Saturday field trips. Prerequisite: Nutrition 115 or 110; 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.

**144. Beef Cattle and Sheep Production** (4) I.

Sainz

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.

**145. Meat Processing and Marketing** (4) II. Lee

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.

**146. Dairy Cattle Production** (4) III. DePeters

Lecture—3 hours; laboratory—3 hours; one mandatory Saturday field trip. Prerequisite: course 124, Ani-

mal 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.

**147. Dairy Processing and Marketing (3) II.**  
Garnett

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) III.** Garnett

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.

**190C. Research Group Conference (1) I, II, III.**  
The Staff (Chairperson in charge)

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.)

**192. Internship in Animal Science (1-12) I, II, III.**  
The Staff (Chairperson in charge)

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 Request Form must be met. (P/NP grading only.)

**\*193. Introduction to Animal Science Research (2) I, III.** Conklin

Lecture—1 hour; discussion—1 hour. Prerequisite: upper division standing. Consideration of ethics in animal research; basic elements of a research plan, project design, and literature review; preparation of a research proposal. Mid-term report and preparation of a brief research proposal. GE credit: Wrt.

**194. Research in Animal Science (3) I, II, III**  
The Staff

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.

**\*194HA-194HB-194HC. Undergraduate Honors Thesis in Animal Science (4-4-4) I-II-III.**

The Staff (Chairperson in charge)  
Lecture—1 hour; laboratory—9 hours. Prerequisite: Neurobiology, Physiology and Behavior 101, Biological Sciences 102, 103 and Nutrition 110; minimum cumulative GPA of 3.2 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.)

**195. Senior Project in Animal Science (3) I, II, III.** The Staff (Chairperson in charge)  
Studio—6 hours. Prerequisite: senior standing in animal science and consent of instructor. Project analysis of a specific area of animal science; industry, communication, outreach, business and marketing, animal welfare, food safety and research are examples. May be repeated for credit for a total of three times. Limited enrollment.

**197T. Tutoring in Animal Science (1-2) I, II, III.**

The Staff (Chairperson in charge)  
Tutoring—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 once for credit. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.**  
The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge.)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**200. Strategies in Animal Production (4) I.**  
Garnett

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) II.**  
Fadel

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. Offered in alternate years.

**\*235. Advanced Techniques in Animal Nutrition Research (2) I,II,III.** The Staff (Calvert in charge)

Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of advanced laboratory techniques to animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (S/U grading only.)

**290. Seminar (1) I, II, III.** The Staff (Chairperson in charge)

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.)

**290C. Research Group Conference (1) I, II, III.**  
The Staff (Chairperson in charge)

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.)

**291. Current Research in Animal Science (1) I, II, III.** The Staff (Chairperson in charge)

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.)

**297. Supervised Teaching in Animal Science (2) I, II, III.** The Staff (Chairperson in charge)

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.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (Sect. 1, 2, 3—let-ter grading; from Sect. 4 on—S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

## Animal Science and Management

(College of Agricultural and Environmental Sciences)

### 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 managerial 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).

**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:

For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal courses or more comprehensive courses on the same subjects are acceptable. Students preparing for medical or veterinary school can meet professional entrance requirements with those of this major if they plan ahead.

UNITS

|                                                                                                                                                                  |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                                                                                     | <b>7-8</b>   |
| See College requirement .....                                                                                                                                    | 7-8          |
| <b>Preparatory Subject Matter</b> .....                                                                                                                          | <b>73-74</b> |
| Animal science (Animal Science 1 and 2, and either 15 or 18 or 41-41L or 42) .....                                                                               | 11-12        |
| Biological sciences (Biological Sciences 1A, 1B, 1C) .....                                                                                                       | 15           |
| Chemistry (Chemistry 2A, 2B, 8A, 8B) .....                                                                                                                       | 16           |
| Computer science (Agricultural Systems and Environment 21) .....                                                                                                 | 3            |
| Economics (Economics 1A, 1B, Management 11A, 11B) .....                                                                                                          | 18           |
| Mathematics (Mathematics 16A-16B or the more advanced mathematics courses) ..                                                                                    | 6            |
| Statistics (Agricultural Systems and Environment 120 or Statistics 100, or other courses in quantitative skills with prior approval of the Master Adviser) ..... | 4            |
| <b>Breadth/General Education Subject Matter</b> ...                                                                                                              | <b>6-24</b>  |
| <b>Depth Subject Matter</b> .....                                                                                                                                | <b>43-44</b> |
| Biological Sciences 101 .....                                                                                                                                    | 4            |
| Nutrition 115 .....                                                                                                                                              | 4            |
| Neurobiology, Physiology and Behavior 101 ..                                                                                                                     | 5            |
| Business Management.....                                                                                                                                         | 19-20        |
| Agricultural and Resource Economics 100A, 130, 140, Animal Science 128;                                                                                          |              |
| Plus at least <i>one</i> course from:                                                                                                                            |              |
| Agricultural and Resource Economics 18, 112, 113, 118A, 118B, 136, 145, 157, 171A, 171B.                                                                         |              |
| Production/Management/Processing/Marketing .....                                                                                                                 | 11           |
| Animal Science 148;                                                                                                                                              |              |



At least *one* course from: Animal Science 115, 118, 119, 140, 143, 144, 146;  
 At least *one* course from: Animal Science 141, 145, 147.

**Restricted Electives .....5-9**

At least two additional courses (minimum 5 units; duplicate from Depth courses not counted) selected with approval of adviser from: Animal Science 103, 104, 105, 106, 115, 118, 119, 120, 120L, 123, 124, 125, 126, 127, 131, 135, 136, 140, 141, 143, 144, 145, 146, 147, 192, 193, 194, 195, Avian Sciences 149, Animal Genetics 107, 108, 109, 111, Nutrition 122, 123, 124, Animal Biology 102 (strongly recommended), Neurobiology, Physiology and Behavior 121, 121L, 130, Wildlife, Fish and Conservation Biology 131.

**Unrestricted Electives .....21-46**

**Total Units for the Degree.....180**

**Major Adviser.** J.G. Fadel.

**Advising Center** for the major (including peer advising) is located in 1202 Meyer Hall (530-752-6118). *Students must secure their academic adviser through this office upon entering the major.*

# Anthropology

(College of Letters and Science)

Robert L. Bettinger, Ph.D., Chairperson of the Department

Department Office, 330 Young Hall  
(530-752-0745/0746)

World Wide Web: <http://anthro.ucdavis.edu>

**Faculty**

- John M. Beaton, Ph.D., Associate Professor
- Robert L. Bettinger, Ph.D., Professor
- Monique Borgerhoff-Mulder, Ph.D., Associate Professor
- David J. Boyd, Ph.D., Associate Professor
- Richard T. Curley, Ph.D., Senior Lecturer
- Alexander H. Harcourt, Ph.D., Professor
- Lynne A. Isbell, Ph.D., Assistant Professor
- Suad Joseph, Ph.D., Professor (*Anthropology, Women's Studies*)
- Smadar Lavie, Ph.D., Associate Professor (*Anthropology, Critical Theory*)
- Martha J. Macri, Ph.D., Associate Professor (*Anthropology, Native American Studies*)
- Henry M. McHenry, Ph.D., Professor
- Peter S. Rodman, Ph.D., Professor
- Roger Rouse, Ph.D., Assistant Professor
- Suzana M. Sawyer, Ph.D., Assistant Professor
- G. William Skinner, Ph.D., Professor (*Anthropology, Center for Comparative Research*)
- Carol A. Smith, Ph.D., Professor
- David G. Smith, Ph.D., Professor
- Janet S. Smith, Ph.D., Professor
- Margaret B. Swain, Ph.D., Adjunct Assistant Professor
- Carolyn F. Wall, Ph.D., Senior Lecturer
- Aram A. Yengoyan, Ph.D., Professor

**Emeriti Faculty**

- William G. Davis, Ph.D., Professor Emeritus
- Jack D. Forbes, Ph.D., Professor Emeritus
- Sarah B. Hrdy, Ph.D., Professor Emerita
- David L. Olmsted, Ph.D., Professor Emeritus
- Delbert L. True, Ph.D., Professor Emeritus

## The Major Program

Anthropology is the systematic study of human beings as they live in groups. It is a diverse field and the courses at UC Davis are subdivided into four categories—biological, social/cultural, linguistics, and archaeology. The student of anthropology learns about human social life—past and present—and gains a broad understanding of humans and society.

**The Program.** Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to *Homo sapiens* should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistory and the techniques and methods of archaeology) should consult an adviser before choosing one degree program or the other.

**Career Alternatives.** Although most practicing anthropologists teach in colleges and universities, a bachelor's degree in anthropology can lead to work in museums, in the Park Service, or in other aspects of public archaeology. A Bachelor of Science degree is a suitable major for premedical and predoctoral preparation. A degree in anthropology with appropriate courses in education also can be good preparation for high school teaching in social or natural sciences.

## A.B. Major Requirements:

|                                                                                                                                                                      | UNITS |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Preparatory Subject Matter .....20</b>                                                                                                                            |       |
| Anthropology 1, 2, 3, 4.....16                                                                                                                                       |       |
| Statistics 13 or 102.....4                                                                                                                                           |       |
| <b>Depth Subject Matter .....44</b>                                                                                                                                  |       |
| Anthropological linguistics: one course.....4                                                                                                                        |       |
| Social-Cultural Anthropology: one course from Anthropology 121N, 122, 123A, 123B, 124, 125A, 125B, 126, 127, 128, 129, 130, 131, 132N, 133, 135, 136, 138, 139.....4 |       |
| Anthropology 137.....4                                                                                                                                               |       |
| Ethnography: one course from Anthropology 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B, 178.....4                             |       |
| Biological anthropology: one course.....4                                                                                                                            |       |
| Archaeology and prehistory: one course....4                                                                                                                          |       |
| Select 8 units from any upper division Anthropology courses chosen in consultation with an adviser.....8                                                             |       |
| Select an additional 12 units in an area of emphasis:                                                                                                                |       |
| (a) <i>Anthropological Linguistics</i>                                                                                                                               |       |
| Anthropology 110.....4                                                                                                                                               |       |
| Select two additional courses in anthropological linguistics.....8                                                                                                   |       |
| (b) <i>Social-Cultural Anthropology</i>                                                                                                                              |       |
| Select one course from Anthropology 128, 129, 130, 131, 139.....4                                                                                                    |       |
| Select two additional courses in social-cultural anthropology.....8                                                                                                  |       |
| (c) <i>Biological Anthropology</i>                                                                                                                                   |       |
| Anthropology 152.....4                                                                                                                                               |       |
| Select two additional courses in biological anthropology.....8                                                                                                       |       |
| (d) <i>Archaeology and Prehistory</i>                                                                                                                                |       |
| Anthropology 170.....4                                                                                                                                               |       |
| Select two additional courses in archaeology and prehistory.....8                                                                                                    |       |
| <b>Total Units for the Major .....64</b>                                                                                                                             |       |

## B.S. Major Requirements:

|                                              | UNITS |
|----------------------------------------------|-------|
| <b>Preparatory Subject Matter .....55-56</b> |       |
| Anthropology 1, 2.....8                      |       |
| Anthropology 3 or 4.....4                    |       |
| Biological Sciences 1A, 1B, 1C.....15        |       |
| Chemistry 2A, 2B, 8A-8B.....16               |       |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Mathematics 16A-16B-16C.....9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| Statistics 13, 32, 100, or 102.....3-4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Depth Subject Matter .....45</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| Six courses in anthropology, including Anthropology 152, 153 and 154A, and the remaining three chosen in consultation with major adviser.....22-25                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| Biological Sciences 101 and Evolution and Ecology 100.....8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| Additional units from the list below to achieve a minimum of 45 upper division units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Anthropology 151, 154B, 155, 156, 157, 157L, 158; Anatomy 100; Biological Sciences 102, 103; Cell Biology and Human Anatomy 101, 101L; Environmental Science and Policy 100, 125; Evolution and Ecology 101, 102, 105, 133, 136, 136L, 138, 141, 147, 149, 170, 170L; Exercise Science 103, 115; Geography 117; Geology 106, 107, 107L, 144, 145, 146; Molecular and Cellular Biology 120L, 121, 146, 150, 150L, 151, 160L, 161, 162, 163, 164; Neurobiology, Physiology and Behavior 101, 101L; Psychology 108, 112, 150; Statistics 104, 106, 108, 110, 130A, 130B. |  |
| <b>Total units for the Major .....100-101</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |

**Recommended**

Anthropology 4, 15; Geology 1, 1L, 3, 3L; Physics 5A, 5B, 5C, or 7A, 7B, 7C; Psychology 1.

**Major Advisers.** A.B. degree: R. Curley; B.S. degree: H.M. McHenry.

## Minor Program Requirements:

|                                                                                                                                                                | UNITS |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Anthropology .....18-25</b>                                                                                                                                 |       |
| <b>General emphasis .....22-25</b>                                                                                                                             |       |
| One course from Anthropology 117, 119, 120.....4                                                                                                               |       |
| One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158.....2-5                                                                       |       |
| One course from Anthropology 170, 171, 172, 178, 179, 181.....4                                                                                                |       |
| One course from Anthropology 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B.....4                                         |       |
| Two courses from Anthropology 101, 117, 119, 120, 121, 122, 123A, 123B, 124, 125A, 126, 127, 128, 129, 130, 131, 132N, 133, 134, 135, 136, 137, 138, 139.....4 |       |
| One additional course from remaining upper division Anthropology courses.....4                                                                                 |       |
| <b>Biological emphasis .....18-21</b>                                                                                                                          |       |
| Anthropology 152, 153, 154A.....13                                                                                                                             |       |
| Two additional upper division Anthropology courses chosen in consultation with B.S. degree undergraduate adviser.....5-8                                       |       |
| <b>Social-Cultural emphasis .....18-21</b>                                                                                                                     |       |
| Anthropology 137.....4                                                                                                                                         |       |
| One course from Anthropology 140A, 140B, 141A, 141B, 142, 143A, 143B, 144, 145, 146, 147, 148A, 148B, 149A, 149B.....4                                         |       |
| Two courses from Anthropology 101, 117, 119, 120, 121, 122, 123A, 123B, 124, 125A, 126, 127, 128, 129, 130, 131, 132N, 133, 135, 136, 138, 139.....8           |       |
| One additional upper division Anthropology course chosen in consultation with A.B. degree undergraduate adviser.....2-5                                        |       |

**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 3.5 in Anthropology courses will be eligible for the honors program. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

**Teaching Credential Subject Representative.**  
See also the Teacher Education Program.

**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.

**Graduate Adviser.** C.A. Smith; J.S. Smith.

## Courses in Anthropology (ANT)

### Lower Division Courses

**1. Human Evolutionary Biology** (4) I. McHenry; II. Isbell; III. D. Smith

Lecture—3 hours; discussion—1 hour. Introduction to human evolution. Processes and course of human evolution; man's place in nature and the study of primates; the biological variability of living man and the genetic background. GE credit: SciEng, Div, Wrt.

**2. Cultural Anthropology** (4) I. Yengoyan; II. Boyd; III. Curley

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.

**3. Introduction to Archaeology** (4) I, II, III. Elston  
Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. GE credit: SocSci, Div.

**4. Introduction to Anthropological Linguistics** (4) I. J.S. Smith; II. Macri

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 socio-cultural issues. GE credit: SocSci, Div, Wrt.

**\*5. Proseminar in Biological Anthropology** (4) III. Rodman

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, Div, Wrt.

**15. Behavioral and Evolutionary Biology of the Human Life Cycle** (5) II. Harcourt

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) III. Curley

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.

**\*21. Anthropological Perspectives on the Politics of Culture in the United States** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Primarily for non-majors. Examines what comparative anthropological analysis can contribute to an understanding of the high-profile issues of cultural politics (the so-called "culture wars") in our own society. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**\*23. Introduction to World Prehistory** (4) III. Beaton

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.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Primarily intended for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**101. Human Ecology** (4) II.

Richerson/Borgerhoff-Mulder

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 1, 2, Environmental Studies 30, Genetics 10, or the equivalent. Critical variables in the processes that relate to humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Science and Policy 101.) GE credit: SocSci.

#### (a) Anthropological Linguistics

**\*110. Elementary Linguistic Analysis** (4) III.

Macri

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Analytical techniques of articulatory phonetics, phonemics, morphophonemics, and morphology. GE credit: SocSci.

**\*112. Comparative Linguistics** (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction. GE credit: SocSci.

**\*113. Indigenous Languages of North America**

(4) II. Macri

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, Linguistics 1, or consent of instructor. Survey of indigenous languages of North America, including their classification, linguistic characteristics, areal features, and socio-cultural aspects. GE credit: SocSci, Div.

**117. Language and Society** (4) III. J.S. Smith

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.

**119. World Writing Systems** (4) I. Macri

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Survey of major world writing systems, including pictographic, syllabic, and alphabetic scripts used in both the Old and New Worlds in ancient and modern times, examined from linguistic and socio-political aspects. GE credit: SocSci.

**120. Language and Culture** (4) II. Yengoyan

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.

#### (b) Social-Cultural Anthropology

**\*121N. Indigenous Peoples and Resource Conservation** (4) III. Borgerhoff-Mulder

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Geology 1 or Environmental Studies 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 developed world. Offered in alternate years. GE credit: SocSci.

**\*122. Economic Anthropology** (4) III. Davis

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting and its modern changes. GE credit: SocSci, Div, Wrt.

**123A. Anthropology and Political Economy** (4) II. C. Smith

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; interrelationships among political institutions, economic infrastructures and cultural complexity. GE credit: SocSci, Div, Wrt.

**\*123B. Resistance, Rebellion, and Popular Movements** (4) III. The Staff

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. GE credit: SocSci, Div, Wrt.

**123C. Multiculturalism and Minority Identity** (4) III. Lavie

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Recent developments in conceptions of minority identity from the point of view of minority populations in the Third World, Europe, and the United States. Challenges to existing categories of gender, race, and class, as well as to nationalism and imperialism. Offered in alternate years.

**124. Religion in Society and Culture** (4) II.

Curley

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.

**125A. Structuralism and Symbolism** (4) II.

Rouse

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.

**125B. Postmodernism(s) and Culture** (4) I. Lavie

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.

**126. Anthropology of Development** (4) I. Boyd

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation. Application of anthropological theory to case studies of rural economy and society. GE credit: SocSci, Div, Wrt.

**127. Urban Anthropology** (4) III. Walton

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.

**128. Kinship and Social Organization** (4) I. Davis

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of family and kinship systems. GE credit: SocSci, Div, Wrt.

**\*129. Self, Identity, and Family** (4) I. Joseph

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, urbaniza-

tion, and globalization on notions of selfhood in different social/cultural systems. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**130. Gender and Sexuality (4) III.** The Staff  
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. GE credit: SocSci, Div, Wrt.

**\*131. Women and Development (4) III.** Joseph  
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. GE credit: SocSci, Div, Wrt.

**\*132N. Ethnohistory (4) I, II.** Walton  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and one other course in either history or anthropology. Course focuses on method and interpretation involved in reconstructing the history and cultural experience of those "people without history" who left no documentary record (pre-literate societies, slaves, peasants). Emphasizes cross-cultural comparison and complementary methods (archaeology, demography, oral history, travel accounts). GE credit: SocSci, Wrt.

**133. Cultural Ecology (4) III.** Orlove  
Lecture—3 hours; discussion—1 hour. 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 more complex environments. (Same course as Environmental Science and Policy 133.) GE credit: SocSci, Div, Wrt.

**134N. Cultural Politics of the Environment (4) III.** Sawyer  
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. Offered in alternate years. GE credit: SocSci, Div.

**\*135. Peasant Society and Culture (4) III.** C.A. Smith  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and culture change. GE credit: SocSci, Div, Wrt.

**136. Ethnographic Film (4) II.** Curley  
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.

**137. Theory in Social-Cultural Anthropology (4) I.** Yengoyan  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative overview of major theoretical orientations in social-cultural anthropology, including evolutionary, historical, functional, ecological, psychological, structural, symbolic, and Marxian approaches. Selected controversies are examined to clarify strengths and limitations of extant theories. GE credit: SocSci.

**\*138. Ethnographic Research Methods in Anthropology (4) II.** Boyd  
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.

**139. Race, Class, Gender Systems (4) III.** C.A. Smith  
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. GE credit: SocSci, Div, Wrt.

**140A. Cultures and Societies of West and Central Africa (4) I.** Curley  
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) I.** Curley  
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.

**\*141A. Indians of North America (4) II.** The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory survey of the Indians of North America: origins, languages, civilizations, and history. GE credit: SocSci, Div, Wrt.

**\*141B. Ethnography of California and the Great Basin (4) III.** Bettinger  
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.

**142. Peoples of the Middle East (4) II.** Lavie  
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.

**\*143A. Ethnology of Southeast Asia (4) II.** Yengoyan  
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. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**\*143B. Philippine Societies and Culture (4) III.** Davis  
Laboratory/discussion—4 hours. Prerequisite: course 2. Introduction to the ethnology of the Philippines. Nature and distribution of ethnic groups, social organizations, cultural patterns and social issues. Emphasis on ethnic minorities, rural populations, effects of modernization, and relation of the state to local groups. GE credit: SocSci, Div, Wrt.

**144. Contemporary Societies and Cultures of Latin America (4) I.** Sawyer  
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, socio-cultural responses to discrimination, and political responses to powerlessness. GE credit: SocSci, Div, Wrt.

**\*145. Colonialism and Ethnicity in the Caribbean (4) II.** The Staff  
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 2 or Afro-American Studies 10. Examination of the contemporary Caribbean nations, sketching their diverse geography, history, and economic life, then showing how selected nations have attempted to solve the problems arising from ethnic diversity in nation-building. GE credit: SocSci, Div, Wrt.

**146. Indigenous Peoples of Mexico and Central America (4) II.** C.A. Smith  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of the native peoples of Mexico and Central America: their histories, socio-political organization, mythologies, languages, material culture, writing systems. GE credit: SocSci, Div, Wrt.

**147. Peoples of the Pacific (4) III.** Boyd  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micronesia, and Melanesia. Consideration of recent changes associated with colonialism and national independence. GE credit: SocSci, Div, Wrt.

**148A. China: Anthropology of a Civilization (4) I.** Skinner  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An analysis of the society, culture and political economy of late traditional China to 1949. Special attention is given to spatial differentiation and historically specific social/cultural change. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**148B. Family, Gender, and Population in Contemporary China (4) II.** Skinner  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of family process, gender relations, and population dynamics in relation to state power in China since 1949. GE credit: SocSci, Div, Wrt.

**\*148C. Ethnic Diversity of China (4) III.** Swain  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of China's ethnic diversity through time and space. Interethnic relations in changing state systems examined among Han majority subethnic groups (e.g., Cantonese, Hakka) and borderlands minorities (e.g., Hmong, Tibetan). Emphasizes intersections of gender and class with race/ethnicity/nationality. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**\*149A. Traditional Japanese Society (4) III.** J. S. Smith  
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. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**\*149B. Contemporary Japanese Society (4) III.** J. S. Smith  
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. Offered in alternate years. GE credit: SocSci, Div, Wrt.

### (c) Biological Anthropology

**151. Primate Evolution (4) III.** McHenry  
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.

**152. Human Evolution (4) II.** McHenry  
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or Biological Sciences 1B. Nature and results of the evolutionary processes



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involved in the formation and differentiation of humankind. GE credit: SciEng, Wrt.

### **153. Human Biological Variation (4)** I. D.G. Smith

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention will be given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: SciEng, Wrt.

### **154A. The Evolution of Primate Behavior (5)** I. Harcourt

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.

### **154B. Ecology and Sociobiology of Primates (4)** III. Isbell

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 154A for students interested in methods of studying, describing and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of captive primates and local birds with quantitative analysis of observations. GE credit: SciEng, Wrt.

### **\*155. Comparative Primate Anatomy (4)** II. The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B. The functional anatomy of monkeys, apes, and man. Emphasis on the anatomical evidence for human evolution. GE credit: SciEng, Wrt.

### **156. Human Osteology (4)** III. McHenry

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variations in race, sex, and age. GE credit: SciEng.

**\*157. Anthropological Genetics (3)** II. D.G. Smith  
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)** I. D.G. Smith

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 (hemagglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarose. (P/NP grading only.) GE credit with concurrent enrollment in course 157: Wrt.

### **158. The Evolution of Females and Males: Biological Perspective (4)** I. Isbell

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.

#### *(d) Archaeology and Prehistory*

### **170. Archeological Theory and Method (4)** II. Delacorte

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.

### **\*171. Geoarcheology (4)** II. Beaton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Theories, methods, and techniques for studying the geomorphic context of archeological sites. Particular attention to sediment and soil attributes and analyses for understanding important local landform features and developmental histories of archeological sites. Offered in alternate years. GE credit: SocSci, Wrt.

### **172. New World Prehistory: The First Arrivals (4)** III. Elston

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)** III. Bettinger

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.

### **176. Prehistory of California and the Great Basin (4)** III. Delacorte

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. GE credit: SocSci, Div, Wrt.

### **178. Hunter-Gatherers (4)** III. Bettinger

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.

### **\*179. Ethnoarchaeology (4)** II. Beaton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines residence patterning, site-formation processes, hunting/foraging behavior and other artifact creating activities and how these contribute to modern archeological thinking. GE credit: SocSci, Div, Wrt.

### **181. Field Course in Archeological Method (9)** Summer. The Staff

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.

### **\*183. Laboratory in Archeological Analysis (4)** III. Bettinger

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.

### **184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4)** I. Elston

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. GE credit: SocSci.

#### *(e) Special Study Courses*

### **\*191. Topics in Anthropology (4)** I. Bettinger

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 once for credit when topic differs.

### **192. Internship in Anthropology (1-12)** I, II, III.

The Staff

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)** I, II, III. The Staff (Chairperson in charge)

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)** I, II, III. The Staff

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)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

## Graduate Courses

### **201. History of Anthropological Theory (4)** I. Yengoyan

Lecture—2 hours; discussion—1 hour; term paper. Historical development of the various fields of anthropology with emphasis upon their interrelationships.

### **\*202. History and Theory of Biological Anthropology (4)** II. McHenry

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 (3)** I. Bettinger

Seminar—3 hours. History of thought in archaeology and analysis of research methods.

### **204. Contemporary Issues in Anthropological Theory (4)** II. C.A. Smith

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.

### **205. History and Theory in Anthropological Linguistics (4)** II. J.S. Smith

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.

### **206. Research Design and Method in Social Anthropology (5)** III. Rouse

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 once for credit. Limited enrollment.

### **\*207. Ethnographic Writing (4)** II. Lavie

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. Offered in alternate years.

**209. Objectives and Methods for College Teaching of Anthropology** (2) I, II, III. The Staff Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience in the classroom situation.

**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.

**211. Advanced Topics in Cultural Ecology** (3) I. Orlove  
Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Science and Policy 133 or the equivalent or consent of instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in alternate years. (Same course as Ecology 211.)

**212. Political Ecology** (4) III. Boyd  
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. Offered in alternate years.

**216. Problems in Archeological Method** (4) II. Elston  
Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

**\*217. Andean Prehistory: Theory and Method** (4) II. Beaton  
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-ceramic and early farming peoples.

**218. Topics in North American Prehistory** (4) I. Bettinger  
Seminar—3 hours; term paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.

**\*220. Field Course in Linguistics** (4) III. Macri  
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) I. Orlove  
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. Problems in Urban Anthropology** (4) I. Walton  
Seminar—3 hours; one paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: class, minorities, poverty, migration, religion, politics, kinship, community, sex-roles, communication, ideology, consciousness in urban context. May be repeated for credit.

**\*223. Economic Anthropology** (4) III. Davis  
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) I. Curley  
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) III. C.A. Smith  
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. Offered in alternate years.

**\*226. Consciousness and Resistance** (4) I. 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. Offered in alternate years.

**227. Behavioral Ecology and Anthropology** (4) III. Borgerhoff-Mulder  
Seminar—3 hours; term paper. Prerequisite: graduate standing. An exploration of the links between behavioral ecology and the study of human cultural variation, focusing on social organization, marriage, reproduction, inheritance and subsistence in traditional and historical populations. May be repeated once for credit. Offered in alternate years.

**\*229. Gender, Identity, and Self** (4) III. Joseph  
Seminar—3 hours; term paper. Course covers intersections of gender, identity, and selfhood cross-culturally and historically. Explores 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.

**230. Family Systems and Reproduction: Theory and Comparisons** (4) II. Skinner  
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) I. Walton  
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) I. Curley  
Seminar—3 hours; term paper. Diachronic analyses of traditional institutions in sub-Saharan Africa.

**\*240. Problems in Afro-American Studies** (4) III. Seminar—3 hours; term paper. Comparative studies of selected Black communities in the New World.

**\*241. Topics in North American Ethnology** (4) III. Forbes  
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) II.  
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) II.  
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.

**\*252. Human Evolution Seminar** (4) II. McHenry  
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.

**253. Seminar in Human Biology** (4) I. D.G. Smith  
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. Offered in alternate years.

**254. Current Issues in Primate Sociobiology** (4) II. Isbell  
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.

**\*258. Evolution and Human Behavior** (4) III. Isbell  
Seminar—3 hours; term paper. Prerequisite: courses 15; 101; 154 A or 154B; 158 or consent of instructor. Focus will be on reproductive strategies and parental investment. May be repeated for credit when topics vary.

**\*265. Concepts and Problems in Applied Anthropology** (4) II. The Staff  
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

**270. Anthropology Colloquium Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated twice for credit. (S/U grading only.)

**\*292. Seminar in Linguistic Anthropology** (4) II. J.S. Smith  
Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

**298. Group Study** (1-4) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

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## Applied Behavioral Sciences

See Community and Regional Development

# Applied Biological Systems Technology

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Biological and Agricultural Engineering.

**Minor Program.** The Department of Biological and Agricultural Engineering offers a minor in Applied Biological Systems Technology for non-engineering students interested in becoming familiar with engineering terminology and procedures. Course work provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.

## Minor Program Requirements:

UNITS

### Applied Biological Systems Technology .....20

Materials requirement, choose one from  
Applied Biological Systems Technology  
15, 16, or 17 .....

Design requirement, Applied Biological Systems Technology 170 .....

Principles and Practices requirement .....

Select at least nine units from Applied Biological Systems Technology 101, 103, 110L, 121, 134, 142, 145, 147, 161, 163, 165, 175.

Select the remaining units from:

Agricultural Systems and Environment 110A, Animal Science 118, 119, 143, 146, Environmental Horticulture 125, Food Science and Technology 102A, 110A, 110B, 180, Hydrologic Science 110, Plant Biology 172, 172L, 196, Viticulture and Enology 140.

**Minor Advisor.** R.H. Piedrahita.

## Courses in Applied Biological Systems Technology (ABT)

### Lower Division Courses

#### 15. Wood Properties and Fabrication (2) III.

Grismer

Lecture—1 hour; laboratory—3 hours. Physical principles and properties of woods as related to strength, design procedures, and selection and use of wood-working equipment. Experience in working with wood. (P/NP grading only.)

#### 16. Metal Properties and Fabrication (2) I.

J. Rumsey

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.)

#### 17. Plastic Properties and Fabrication (2) III.

Jenkins

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.)

#### 49. Field Equipment Operation (2) I, III.

J. Rumsey

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.)

#### 52. Field Equipment Maintenance (2) II.

J. Rumsey

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 16 or consent of instructor. Troubleshooting and major repair of field equipment. Intermediate welding to include hardfacing and inert gas welding.

Class projects on maintenance, repair and fabrication. (P/NP grading only.)

#### 90C. Research Conference for Lower Division Students (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: consent of instructor. Research conference for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Hills in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Hills in charge)

(P/NP grading only.)

### Upper Division Courses

#### 101. Engine Technology (3) II. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction and operation. Ideal Otto and Diesel cycles. Engine efficiencies and power measurements. Study of valves, fuels, combustion, carburetion and fuel injection, conventional and electronic ignition, starting and charging, cooling, lubricating and emission control systems.

#### 103. Electric Power Applications (3) III.

The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 1B or 5B. Principles of electric power involved in common home and light industrial applications; experience in techniques of wiring, motor and appliance selection, energy conservation and safety.

#### 110L. Experiments in Food Engineering (2) II.

Singh

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.

#### \*121. Animal Housing and Environment Management (2) II. Zhang

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.

#### 134. Pest Control Practices (2) II. Giles

Lecture—2 hours. Prerequisite: Botany 120 or Entomology 100 or Environmental Toxicology 101 or Plant Pathology 125 or the equivalent. Physical aspects of agricultural pest control. Mechanical systems for safe and effective application of pest control materials. Biological, legal and environmental considerations of pest control and pesticide application.

#### 142. Equipment and Technology for Small Farms (2) III. J. Rumsey, Plant

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.)

#### 145. Field Equipment Technology (2) III.

J. Rumsey

Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing and Physics 1A or 5A. Function, construction, and operating principles of field equipment for harvesting fruit, nut, vegetable, and field crops. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling field equipment.

#### 147. Field Equipment Management (2) I, II, III.

J. Rumsey

Lecture—2 hours. Prerequisite: course 49 (may be taken concurrently) or consent of instructor. Fundamentals of field machinery management to include machinery capacity, selection from capacity and economic standpoints, scheduling, acquisition options, and trade-in considerations. Estimation of operating costs of field machinery.

#### 161. Water Quality Management for Aquaculture (3) II. Piedrahita

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.

#### 163. Aquaculture Systems Engineering (3) III. Piedrahita

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.

#### 165. Irrigation Practices for an Urban Environment (2) III. Hills

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.

#### 170. Design in Biological Systems Technology (3) II. Miles, Steinke

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 1A or 5A and course 15, 16, or 17. Introduction and application of design procedures and tools. Techniques are presented for solving design problems and selecting appropriate materials. Catalog and handbook utilization, government safety regulations, and environmental considerations are discussed.

#### 175. Introduction to Precision Agriculture (3) I.

Upadhyaya

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Agricultural Systems and Environment 21 or the equivalent computer experience. Concepts of precision agriculture. Variability in yield, yield monitors and mapping, remote sensing, variability in plant and soil conditions, global positioning system (GPS), geographic information system (GIS), sensors and actuators, map controlled variable rate application (VRT), socio-economic aspects of precision agriculture.

#### 180. Introduction to Geographic Information Systems (5) I. Plant, Wallender

Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: Agricultural Systems and Environment 21; Mathematics 16A-16B, and Statistics 13, or the equivalents. Management and analysis of georeferenced data. Spatial database management and modeling. Applications of agriculture and biological resource management. Cartographic modeling. Vector-based geographic information system.

#### 181. Geographic Information Systems Modeling (5) II. Wallender

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 180. Advanced topics in Geographic Information Systems (GIS), such as raster-based GIS (GRID), triangular irregular network (TIN), and networks. Use of GIS ARC/INFO for remote sensing and modeling of environmental terrain, transportation, hydrology, and site specific crop management.

#### 182. Environmental Analysis with Geographical Information Systems (GIS) (5) III.

M. Zhang

Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: course 180; course 181 recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment. Precision farming. Natural resource management. Spatial database structures. Remote sensing applications. Data quality and error analysis in GIS. (Same course as Hydrologic Science 182.)

#### 190C. Research Conference for Advanced Undergraduates (1) I, II, III. The Staff

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.)

#### 192. Internship in Applied Biological Systems Technology (1-5) I, II, III. The Staff (Hills in charge)

Internship—3-15 hours. Prerequisite: upper division standing; approval of project prior to period of intern-

ship. 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) I, II, III. The Staff

Tutorial—1.5 hours. Prerequisite: upper division standing and consent of instructor. To provide teaching experience to upper division undergraduate students. Activities will vary depending on the nature of the course. May include (but not limited to) assistance in laboratory sessions, advising on projects, tutoring on course material, and grading of homework assignments. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Hills in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Hills in charge)

(P/NP grading only.)

**Graduate Courses**

**233. Advanced Pest Control Practices** (3) II. Giles

Lecture—2 hours; laboratory—3 hours. Prerequisite: introductory class in entomology, plant pathology, weed science or similar discipline. 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.

**290C. Graduate Research Conference** (1) I, II, III. The Staff

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.)

**298. Group Study** (1-5) I, II, III. The Staff (Hills in charge)

**299. Research** (1-12) I, II, III. The Staff (Hills in charge)  
(S/U grading only.)

**Professional Course**

**317. Teaching Agricultural Mechanics** (2) II. J. Rumsey

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.

**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 Applied Mathematics Graduate Group. 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. Areas of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter only.

**Preparation.** The program encourages application from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, and vector calculus. A rigorous course in advanced calculus is strongly encouraged.

**Graduate Advisers.** A. Cheer (Mathematics); J. Hunter (Mathematics); A. Krener (Mathematics).

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## Applied Physics

See Physics

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## Aquaculture

See **Animal Biology; Animal Science; Applied Biological Systems Technology; and Wildlife, Fish and Conservation Biology**

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## Art History

(College of Letters and Science)  
Jeffrey Ruda, Ph.D., Program Director  
Department Office, 111A Art Building (530-752-0105)  
World Wide Web: <http://idea.ucdavis.edu/art>

**Faculty**

Dianne Sachko Macleod, Ph.D., Professor  
Jeffrey Ruda, Ph.D., Professor  
Diana Strazdes, Ph.D., Assistant Professor

**Emeriti Faculty**

Mary H. Fong, Ph.D., Professor Emerita  
Robert J. Grigg, Ph.D., Professor Emeritus  
Seymour Howard, Ph.D., Professor Emeritus

### The Major Program

Art History is the study of the visual arts in civilization. It examines changing aesthetic and cultural values and significant material and ideological developments as seen in works of art and architecture. It emphasizes visual as well as verbal intelligence, providing more than the standard advantages of liberal arts training.

**The Program.** The student majoring in art history begins with courses which survey the arts of Asia, Europe, and America. More specialized courses follow in ancient, Byzantine, medieval, Renaissance,

baroque, modern, Non-Literate, East Asian, and American art and architecture. At the same time students are encouraged to take classes in related disciplines such as religion, history, philosophy, literature, and foreign languages.

**Career Alternatives.** The major prepares students for advanced study in either graduate school or professional programs. It can also serve as the foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment.

### A.B. Major Requirements:

|                                                                                                                 |           |
|-----------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                 | UNITS     |
| <b>Preparatory Subject Matter</b> .....                                                                         | <b>20</b> |
| Three courses selected from Art History 1A, 1B, 1C, 1D.....                                                     | 12        |
| One art studio course in drawing, printmaking, painting, or photography.....                                    | 4         |
| One art studio course in sculpture or ceramics .....                                                            | 4         |
| <b>Depth Subject Matter</b> .....                                                                               | <b>36</b> |
| Nine upper division art history courses, which must be taken in at least four of the following five areas ..... | 36        |
| (a) Ancient/Medieval/Northern Renaissance,                                                                      |           |
| (b) Southern Renaissance/Baroque,                                                                               |           |
| (c) Modern,                                                                                                     |           |
| (d) China/Japan,                                                                                                |           |
| (e) Non-Literate                                                                                                |           |
| <b>Total Units for the Major</b> .....                                                                          | <b>56</b> |

### Minor Program Requirements:

|                                                                                                                                                                                |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                                                | UNITS     |
| <b>Art History</b> .....                                                                                                                                                       | <b>20</b> |
| Five upper division art history courses .....                                                                                                                                  | 20        |
| Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area (one lower division substitute course permissible): |           |
| (a) Ancient/Medieval/Northern Renaissance,                                                                                                                                     |           |
| (b) Southern Renaissance/Baroque,                                                                                                                                              |           |
| (c) Modern,                                                                                                                                                                    |           |
| (d) China/Japan,                                                                                                                                                               |           |
| (e) Non-Literate                                                                                                                                                               |           |

**Honors Program.** An Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes one quarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 194H). Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest 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 also 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. Further information may be obtained by writing to the Graduate Adviser or consulting the *Graduate Announcement*.

### Courses in Art History (AHI)

**Lower Division Courses**

**1A. Ancient Art** (4) I. Roller  
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. GE credit: ArtHum.

**1B. Medieval and Renaissance Art** (4) II. Grigg

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## Applied Mathematics (A Graduate Group)

Angela Y. Cheer, Ph.D., Chairperson of the Group  
Group Office, 570 Kerr Hall (530-752-8131)

World Wide Web:  
<http://math.ucdavis.edu/~gehrmann/grad/ggambroc.html>

**Faculty.** Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Biological Sciences; Chemistry; Engineering; Computer Science, Chemical and Materials Science, Civil and Environmental, Electrical and Computer, and Mechanical and Aeronautical; Environmental Science and Policy; Epidemiology and Preventive Medicine; Evolution and Ecology; Land, Air and Water Resources; Management; Mathematics; Physics; Radiology; Statistics; and Wildlife, Fish and Conservation Biology.



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.

**1C. Baroque and Modern Art** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. GE credit: ArtHum, Div.

**1D. Asian Art** (4) II. The Staff  
Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Mao's China. GE credit: ArtHum, Div.

**\*25. Introduction to Architectural History** (4) II. The Staff

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.

**\*25G. Writing: Introduction to Architectural History** (1) II. The Staff  
Discussion—1 hour. Prerequisite: course 25 concurrently. Small group discussions and preparation of short papers for course 25. GE credit with concurrent enrollment in course 25: Wrt.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in charge)  
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Program Director in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**\*150. Arts of Sub-Saharan Africa** (4) III. The Staff  
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of sub-Saharan 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) III. The Staff  
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) III. The Staff  
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) II. Flavell  
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.

**\*154A. Early Greek Art and Architecture** (4) II. Roller  
Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of history and significance of major monuments in Greek art and architecture from the Homeric, Geometric Age to the Golden Age and the death of Socrates. GE credit: ArtHum, Wrt.

**154B. Later Greek Art and Architecture** (4) II. Roller  
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander to the end of the Hellenistic Age and the death of Cleopatra. GE credit: ArtHum, Wrt.

**\*155. Roman Art** (4) III. Roller

Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome. GE credit: ArtHum, Wrt.

**163A. Chinese Art** (4) I. The Staff  
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.

**163B. Chinese Painting** (4) II. The Staff  
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.

**163C. Painting in the People's Republic of China** (4) III. The Staff  
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.

**\*164. The Arts of Japan** (4) III. The Staff  
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) I. The Staff  
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.

**\*176A. Art of the Middle Ages: Early Christian and Byzantine Art** (4) I. The Staff  
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) I. The Staff  
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) I. The Staff  
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) III. The Staff  
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) I. The Staff  
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) II. Ruda  
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.

**\*178B. Italian Renaissance Art** (4) II. Ruda  
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.

**178C. Italian Renaissance Art** (4) III. Ruda  
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.

**179B. Baroque Art** (4) I. Ruda  
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.

**\*182. British Art (1750-1914)** (4) III. Macleod  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture—1750 to 1914. Topics include influence of class and gender on art education, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and lesser-known advocates of military, social realist, and colonial themes. GE credit: ArtHum, Div, Wrt.

**183A. Art in the Age of Revolution** (4) I. Macleod  
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Analysis of political and stylistic implications of European painting from 1750 to 1860. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet. GE credit: ArtHum, Wrt.

**183B. Impressionism and Post-Impressionism** (4) II. Macleod  
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including an examination of the paintings of Manet, Monet, Renoir, Whistler, Gauguin, van Gogh, Cezanne, and Redon. GE credit: ArtHum, Wrt.

**183C. Modern Art: 1900-1945** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of modern movement in European art from Fauvism and Cubism to Surrealism and Abstract Expressionism (1900-1945). Artists studied include Picasso, Matisse, Kandinsky, Malevich, and Pollock. GE credit: ArtHum, Wrt.

**\*183D. Modern Sculpture** (4) III. The Staff  
Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

**183E. Contemporary Art: 1945 to the Present** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Painting and sculpture in Europe and America from 1945 to the present, with emphasis on the New York school, Pop art, Op art, Earthworks, and Feminist art. GE credit: ArtHum, Div, Wrt.

**\*184. Twentieth Century Architecture** (4) I. The Staff  
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.

**188A. The American Home** (4) III. Strazdes  
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.



**188B. Architecture of the United States** (4) I. Strazdes  
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. American architecture from the first European settlers to Postmodernism. Technological and formal developments will be examined within the social, political, and economic context in which they emerged. Issues include ideals of domesticity and the development of the architectural profession. GE credit: ArtHum, Wrt.

**\*188C. Painting of the United States** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour; term paper or gallery studies and review. American pictorial development from 1650 to the present, with emphasis on twentieth-century developments. GE credit: ArtHum, Wrt.

**188D. American Painting and Sculpture to the Civil War** (4) I. Strazdes  
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.

**188E. American Painting and Sculpture from the Civil War to World War II** (4) III. Strazdes  
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.

**\*190. Undergraduate Seminar** (4) II. The Staff (Program Director in charge)  
Lecture—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

**192. Internship** (2-12) I, II, III. The Staff (Program Director in charge)  
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 once for credit. (P/NP grading only.)

**194H. Special Study for Honor Students** (4) I, II, III. The Staff  
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) I, II, III. The Staff (Program Director in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Program Director in charge)  
(P/NP grading only.)

**Graduate Courses**

**200. Introduction to Art Historical Research** (4) I. Macleod  
Seminar—4 hours. Introductory sampling of major writings, methods, and sources used for research in the discipline of art history.

**250. Problems in Art Historical Research** (4) I, II. Strazdes and staff  
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.

**\*251. Seminar in Tribal Arts** (4) II. The Staff  
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) III. The Staff  
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) III. The Staff  
Seminar—3 hours; paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor.

**\*276. Seminar in Medieval Art** (4) III. Grigg  
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) III. Ruda  
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.

**283. Seminar in Modern European Art** (4) II. Macleod  
Seminar—3 hours; term paper. Selected areas of special study in art since 1800 in Europe. May be repeated for credit with consent of instructor.

**\*288. Seminar in European and American Architecture** (4) II. The Staff  
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.

**299. Individual Study** (1-6) I, II, III. The Staff (Program Director in charge)  
(S/U grading only.)

**Professional Course**

**\*390. Introduction to Teaching Art History for Teaching Assistants** (1) I, II, III. The Staff  
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** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Professional Courses**

**401. Museum Training: Curatorial Principles** (4) II. Amerson  
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.

**\*402. Museum Training: Exhibition Methods** (4) II. Amerson  
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.

**Note:** *Various of the above courses are not offered each year; please check the quarterly Class Schedule and Room Directory.*

**Art Studio**

(College of Letters and Science)  
Robert Sommer, Ph.D., Chairperson of the Department  
Department Office, 111A Art Building (530-752-0105)  
World Wide Web: <http://idea.ucdavis.edu/art>

**Faculty**

L. Price Amerson, Jr., Ph.D., Lecturer (*Director, Nelson Gallery*)  
Conrad Atkinson, R.A.S. (honors), Professor  
Squeak Carnwath, M.F.A., Professor  
William Henderson, M.F.A., Professor  
Lynn Hershman, M.A., Professor  
Harvey Himelfarb, M.A., Professor, *Academic Senate Distinguished Teaching Award*  
David Hollowell, M.F.A., Professor  
Malaquias Montoya, M.A., Cooperating Professor  
Lucy A. Puls, M.F.A., Professor  
Annabeth Rosen, M.F.A., Assistant Professor  
Cornelia Schulz, M.F.A., Professor, *Academic Senate Distinguished Teaching Award*  
Baochi Zhang, M.F.A., Assistant Professor

**Emeriti Faculty**

Richard D. Cramer, M.F.A., Professor Emeritus  
Roy DeForest, M.A., Professor Emeritus  
Roland C. Petersen, M.A., Professor Emeritus  
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 the visual arts.

**The Program.** For the beginning student, the major offers an introduction to drawing, composition, sculpture, and art history. Students may then advance to more specialization (drawing, painting, sculpture, printmaking, ceramics, photography, film making, electronic arts, as well as theory and criticism) in upper division work.

**Portfolios.** Portfolios are not required for admission to the major. However, admitted students, once at Davis, should keep a continuing portfolio of their art work, which is subject to faculty perusal at such times as when the student is declaring the major, requesting independent study courses, and scheduling an exhibition in the student gallery.

**Career Alternatives.** The studio art graduate is prepared for graduate work 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     |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                             | <b>24</b> |
| Three courses from Art Studio 2, 3, 4, 5, 16; see prerequisites required for upper division courses .....                                                                                                                           | 12        |
| Three courses from Art History 1A, 1B, 1C, 1D, Art Studio 30 .....                                                                                                                                                                  | 12        |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                   | <b>40</b> |
| Six courses, under three different instructors, chosen from Group A, Practice of Art ...24<br>Group A: Art Studio 101, 102, 103, 104, 110, 111, 113, 114, 115, 116, 117, 120, 125, 126, 127, 128, 141, 142, 143, 144, 145, 146, 171 |           |

Two courses from Group B, Theory and Criticism.....8  
*Group B:* Art Studio 131, 132A, 132B, 147, 148, 149, 150

Two upper division courses in art history....8

**Total Units for the Major** .....64

#### Recommended

- (a) Students interested in drawing and painting should take Art Studio 2, 3, 4 (course 5 is recommended);
- (b) Students interested in sculpture should take Art Studio 2, 3, 5 (course 4 is recommended); and
- (c) Students preparing for graduate work in any of the environmental design professions should take Art Studio 2, 5, 16.

**Major Advisers.** See the *Class Schedule and Room Directory*.

### 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 chosen in consultation with a faculty adviser (one lower division substitute course permissible).....20

**Teaching Credential Subject Representative.** Department Chairperson. See also 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. Detailed information regarding graduate study may be obtained from the Graduate Admissions Office or the Art Office.

### Courses in Art Studio (ART)

#### Lower Division Courses

**2. Drawing I** (4) I, II, III. Henderson, Atkinson, Carnwath, Schulz and staff  
 Studio—6 hours. Form and composition in black and white.

**3. Drawing II** (4) I, II, III. Henderson, Schulz  
 Studio—6 hours. Prerequisite: course 2. Form and composition in color.

**4. Life Drawing** (4) I, II, III. Hollowell, Zhang  
 Studio—6 hours. Prerequisite: course 2. Form in composition using the human figure as subject.

**5. Sculpture** (4) I, II, III. Puls, Zhang  
 Studio—6 hours. Form in space using plaster and other media.

**10. Introduction to Art Appreciation** (3) I, III. The Staff  
 Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture and industrial art. Illustrated lectures. Intended for non-majors. GE credit: ArtHum.

**16. Descriptive Drawing** (4) III. Schulz  
 Studio—6 hours. Objective drawing and rendering; representations of space.

**30. Introduction to Contemporary Visual Culture** (4) III. The Staff  
 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.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

*Note:* Upper division courses are listed under three groups: **(A)** Practice of Art; **(B)** Theory and Criticism; **(C)** Special Study Courses.

Preenrollment in upper division courses is restricted to art majors. Art minors may obtain permission to preenroll by filling out a "Waiver of Restriction" form in the Art office.

**101. Painting: Materials and Carriers** (4) I, II, III. Atkinson, Carnwath, Schulz  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

**102. Painting** (4) I, II. Henderson, Schulz  
 Studio—6 hours. Prerequisite: course 101 or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated once for credit with consent of instructor.

**103. Advanced Drawing** (4) I. Zhang  
 Studio—6 hours. Prerequisite: course 2, 3, 4, 16, or consent of instructor. Advanced drawing, composition and form in black and white and color. May be repeated once for credit with consent of instructor.

**104. Figure Drawing and Painting** (4) I, III. Hollowell and staff

Studio—6 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

**110. Photography I** (4) I, II, III. The Staff  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

**111. Photography II** (4) II. The Staff  
 Studio—6 hours. Prerequisite: course 110 or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

**113. Interdisciplinarity** (4) I. Hershman  
 Studio—6 hours. Prerequisite: one course in Art History or Art Studio. Focus on the uses of two or more art forms to make a unique art work; also, ideas of collaboration and reconfigured and integrated forms as new methods of expression that do not solely depend on unique authorship.

**114. Identity and Technology** (4) II. Hershman  
 Studio—6 hours. Prerequisite: one course in Art History or Art Studio. The notion of "self", "portraiture" and "identity" as it is defined in an electronic world in which media alters perceptions of belief as individuals and society. Hands-on projects plus theoretical analysis of media.

**\*115. Film-making I** (4) I. The Staff  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, or consent of instructor. Film-making as an art form; 8 and 16 mm. cameras and sound track. May be repeated once for credit with consent of instructor.

**\*116. Video Practice and Theory** (4) II. Hershman  
 Studio—6 hours. Prerequisite: 12 units of lower division art studio classes. Production techniques of video, including shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques.

**117. Experimental Documentary** (4) II. Hershman  
 Studio—6 hours. Prerequisite: upper division standing. Study of the documentary form with particular attention to hybrid forms of film, video and computer genres. May be repeated once for credit with consent of instructor when topic differs.

**\*120. Intermedia Art** (4) III. Zhang  
 Studio—6 hours. Prerequisite: three courses chosen from the following: courses 2, 3, 4, 5, and 16. Use of multiple media in artmaking. Human body as artistic medium. Non-traditional visual media. Problem solving on conceptual and technical levels. Visual metaphors, narrative, intuition, meaning and expression in art. May be repeated once for credit when topic differs and with consent of instructor.

**125. Printmaking: Relief** (4) III. Carnwath

Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

**126. Printmaking: Intaglio** (4) I. Atkinson  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, hard- and soft-ground, burin engraving and related methods. May be repeated once for credit with consent of instructor.

**127. Printmaking: Lithography** (4) II. The Staff  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other planographic methods. May be repeated once for credit with consent of instructor.

**\*128. Printmaking: Serigraphy** (4) III. The Staff  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Silk screen and related stencil methods. May be repeated once for credit with consent of instructor.

**\*131. Gender, Vision, and Difference** (4) II.

The Staff  
 Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 30 or Women's Studies 50. Examination of the way vision establishes power relations within cultures. How vision and visual culture determine who is visible and invisible, who is beautiful and who is ugly, and who is included and who is excluded within the languages of culture. GE credit: ArtHum, Div, Wrt.

**\*132A. The Tradition of Modernism** (4) I.

The Staff  
 Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: one of course 30, or Art History 183A, 183B, 183C or 184. The emergence of modernism in painting and sculpture, from the early twentieth century to the 1940s. Critical examination of the emergence of modernism, the ideologies it supported, and the exclusions it practiced. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*132B. The Theory of Modernism** (4) II. The Staff  
 Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 132A. Re-examination of materials of Modernist art through a set of critical analytical tools which will help in understanding what cultural and ideological beliefs these art forms sustained. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**141. Sculpture: Material Explorations** (4) II. Puls  
 Studio—6 hours. Prerequisite: course 5. Primary application and exploration of a single sculptural material. Examination of its properties, qualities and characteristics for three-dimensional expression. May be repeated twice for credit in different subject area with consent of instructor.

**142. Sculpture: Ceramics I** (4) I, II. Rosen  
 Studio—6 hours. Prerequisite: course 2, 3, 4 and 5, or consent of instructor. Introduction to ceramic forms and processes.

**143. Sculpture: Ceramics II** (4) II. Rosen  
 Studio—6 hours. Prerequisite: course 142 or consent of instructor. Introduction to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

**144. Sculpture: Figure Modeling** (4) III. Zhang  
 Studio—6 hours. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

**145. Sculpture: Concepts** (4) III. Puls  
 Studio—6 hours. Prerequisite: course 5 or consent of instructor. Investigation through the creation of sculpture of the relationship of idea to form and material. May be repeated once for credit in different subject area with consent of instructor.

**146. Sculpture: Ceramics III** (4) III. Rosen  
 Studio—6 hours. Prerequisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

**\*147. Theory and Criticism of Photography** (4) III. The Staff

Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. GE credit: ArtHum, Wrt.

**148. Theory and Criticism: Painting and Sculpture** (4) I, III. The Staff

Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces. GE credit: ArtHum, Wrt.

**\*149. Introduction to Critical Theory** (4) I. The Staff

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) I. Hershman

Lecture—3 hours; term paper. Prerequisite: course 116 or 117. The history of electronic media, stressing both critique, application and relationship to art practice. Analysis of the conceptual biases of electronic media as an artistic mode of expression. GE credit: ArtHum, Wrt.

**171. Mexican and Chicano Mural Workshop** (4) III. Montoya

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 once for credit. (Same course as Chicana/o Studies 171.)

**Group C: Special Study Courses****192. Internship** (2-12) I, II, III. The Staff (Chairperson in charge)

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.)

**193. Seminar in Art Practice** (4) I. Puls (Chairperson in charge)

Discussion/laboratory—8 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division standing; taking or having taken courses in upper division drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) done for group discussion and criticism, as well as group discussion of contemporary topics in the visual arts. May be repeated once for credit.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****290. Seminar** (4) I, II, III. Atkinson, Puls, Carnwarth and staff

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

**291. Seminar: Critical Evaluation** (1) II. The Staff (Graduate Adviser in charge)

Seminar—1 hour. May be repeated for credit. (S/U grading only.)

**292. Seminar: Comprehensive Qualifying** (1) I. The Staff (Graduate Adviser in charge)

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.)

**299. Individual Study** (1-6) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299D. Comprehensive Project** (9) III. The Staff (Graduate Adviser in charge)

An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)

**Professional Courses****401. Museum Training: Curatorial Principles** (4) II. Amerson

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.

**\*402. Museum Training: Exhibition Methods** (4) II. Amerson

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.

**Note:** *Various of the above courses are not offered each year; please check the quarterly Class Schedule and Room Directory.*

## Asian American Studies

(College of Letters and Science)

Stanley Sue, Ph.D., Program Director

Program Office, 3102 Hart Hall (530-752-3625)

**Committee in Charge**

Angela Y. Cheer, Ph.D. (*Mathematics*)

Roy H. Doi, Ph.D. (*Molecular and Cellular Biology*)

Rosa Linda Fregoso, Ph.D. (*Women's Studies*)

Isao Fujimoto, M.A. (*Asian American Studies, Human and Community Development*)

Darrell Y. Hamamoto, Ph.D. (*Asian American Studies*)

Wendy A. Ho, Ph.D. (*Asian American Studies, Women's Studies*)

Peter C.Y. Leung, M.S. (*Asian American Studies*)

Kent Ono, Ph.D. (*American Studies, Asian American Studies*)

Karen Shimakawa, Ph.D. (*Asian American Studies*)

Stanley Sue, Ph.D. (*Asian American Studies, Psychology*)

**Faculty**

Darrell Y. Hamamoto, Associate Professor

Wendy A. Ho, Ph.D., Assistant Professor

Peter C.Y. Leung, M.S., Senior Lecturer

Kent A. Ono, Assistant Professor

Karen Shimakawa, Ph.D., Assistant Professor

Stanley Sue, Ph.D., Professor

**Program of Study.** Currently, Asian American Studies does not offer a major. A minor program in Asian American Studies is available to students interested in this field of study.

**Minor Program Requirements:**

UNITS

**Asian American Studies** .....20

Asian American Studies 110 .....4

An additional four courses from Asian American Studies 100, 101, 111, 112, 120, 130, 136, 150, 155, 192 (No more than 4 units of 192 may be counted toward this total) .....16

**Minor Adviser.** P. Leung.

**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.)

**Related Courses.** For courses in Asian languages, see Cantonese (below) and Chinese and Japanese (under East Asian Languages and Cultures). For other Asian courses, see East Asian Languages and Culture and East Asian Studies.

**Courses in Asian American Studies (ASA)**

*Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program, 3102 Hart Hall (530-752-3625).*

**Lower Division Courses****1. Historical Experience of Asian Americans** (4) I. Hamamoto

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.

**2. Contemporary Experience of Asian Americans** (4) II. Hamamoto

Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and culture. Identity development of Asian Americans and their communities in the context of contemporary American institutional practices. GE credit: SocSci, Div, Wrt.

**\*20. Calligraphic Expression in Asian American Culture** (3) II. Leung

Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through some basic writing. Trace origins, principles and styles of Chinese and Japanese calligraphy. Offered in alternate years.

**92. Internship** (1-3) I, II, III. The Staff (Director in charge)

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) I, II, III. The Staff (Director in charge)

Primarily intended for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Director in charge)

(P/NP grading only.)

**Upper Division Courses****100. Asian American Communities** (4) I. The Staff

Lecture/discussion—4 hours. Prerequisite: course 110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

**\*101. Language and Educational Issues of Asian Immigrants** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in American society, especially in public schools. Overview of public policies on language and programs, particularly for Asian language minority students. Offered in alternate years.

**110. Theoretical Perspectives in Asian American Studies** (4) I. Hamamoto

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.

**111. Ethnic Self and Identity** (4) III. Sue  
Lecture/discussion—4 hours. Prerequisite: course 101. Study of cultural and social psychological influences on Asian Americans, with the individual as the unit of analysis. GE credit: SocSci, Div.



**112. Asian/Pacific American Women** (4) II. Ho  
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the cultural, social, and political situation of Asian and Pacific American women using theoretical perspectives from social science disciplines: socialization, family dynamics, domestic and political power, economic production, and division of labor. GE credit: SocSci, Div.

**\*120. Biracial and Multiracial Asian Pacific American Experiences** (4) III. Ono  
Lecture/discussion—4 hours. Prerequisite: 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. Provides critical approaches to the analysis of popular media and academic representations. Offered in alternate years. GE credit: Div.

**130. Asian American Literature** (4) III. Ho  
Lecture/discussion—4 hours. Prerequisite: course 1 or 2, or consent of instructor. Analysis of Asian American writings as expressions of various cultural themes, psychological issues, interpersonal relationships and sociopolitical influences on the Asian American experience.

**136. Asian American Drama** (4) II. Shimakawa  
Lecture/discussion—4 hours. Prerequisite: courses 1, 2, or 130; or consent of instructor. Comparative introduction to the dramatic literature of Asian American playwrights such as Frank Chin, Philip Kan Gotanda, Velina Hasu Houston, David Henry Hwang, Wakako Yamauchi, and others from diverse socio-historical, artistic, and theoretical contexts.

**150. Filipino American Experience** (4) II. The Staff  
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.

**155. Legal History and the Asian American** (4) II. Shimakawa  
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; consent of instructor. Legal history of Asian Americans beginning with the experience of Chinese Americans in the mid-19th century. Includes an examination of laws affecting Asian American communities in immigration, economic activities, and World War II internment.

**192. Internship** (1-5) I, II, III. The Staff (Director in charge)  
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) I, II, III. The Staff (Director in charge)  
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) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. Primarily intended for upper division students. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

## Courses in Cantonese (CAN)

### Lower Division Courses

**\*1-2-3. Elementary Cantonese** (5-5-5) I-II-III. Leung  
Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250 Chinese characters will be introduced during Cantonese 2 and 3. (Not open to native speakers.)

**\*4-5-6. Intermediate Cantonese** (3-3-3) I-II-III. Leung  
Lecture—2 hours; recitation—2 hours. Prerequisite: course 1-2-3 or the equivalent. Development of conversational skills in a cultural context. Community-oriented language materials in health care, social service, and bilingual education will be introduced.

## Asian Studies

See **Asian American Studies; East Asian Languages and Cultures; and East Asian Studies**

## Astronomy

See **Physics**

## Atmospheric Science

(College of Agricultural and Environmental Sciences)  
**Faculty.** See under Department of Land, Air and Water Resources.

### The Major Program

Atmospheric science is the study of the layer of air that surrounds the planet. It includes all weather phenomena, such as frontal systems and clouds, as well as severe weather events such as hurricanes and tornadoes. Concerns regarding the effects of human activity on the quality of the air we breathe, and on possible global warming are also central to this field of study.

**The Program.** Modern meteorology is a quantitative science that is becoming increasingly computer oriented. In addition to the study of daily weather events, the program deals with fundamental physical processes that involve the general circulation of the atmosphere; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; atmospheric interaction with the biosphere; climate variations; air pollution meteorology; and developments in modern meteorological instrumentation. 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 governments, research and development in the private sector, and education. Examples of career areas are weather forecasting, agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, environmental consulting, and weather research. About half of our graduates continue their

education by seeking the M.S. or Ph.D. degree in atmospheric science.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

|                                                                                                                                                                                                                                               |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                               | UNITS        |
| <b>English Composition Requirement</b> .....                                                                                                                                                                                                  | <b>0-8</b>   |
| See College requirement                                                                                                                                                                                                                       |              |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                       | <b>62</b>    |
| Biological sciences courses selected with adviser's approval .....                                                                                                                                                                            | 8            |
| Chemistry (Chemistry 2A, 2B) .....                                                                                                                                                                                                            | 10           |
| Computer science (Engineering 5 or the equivalent in FORTRAN programming) .....                                                                                                                                                               | 3            |
| Mathematics (Mathematics 21A, 21B, 21C, 21D, 22A, 22B) .....                                                                                                                                                                                  | 22           |
| Meteorology (Atmospheric Science 60) .....                                                                                                                                                                                                    | 4            |
| Physics (Physics 9A, 9B, 9C) .....                                                                                                                                                                                                            | 12           |
| Statistics (Statistics 32) .....                                                                                                                                                                                                              | 3            |
| <b>Breadth/General Education</b> .....                                                                                                                                                                                                        | <b>28</b>    |
| Satisfaction of General Education requirement; additional units in social sciences and humanities to total 28 units.                                                                                                                          |              |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                             | <b>32</b>    |
| Atmospheric Science 110, 111, 120, 121A, 121B, 124, 128 .....                                                                                                                                                                                 | 25           |
| Upper division Atmospheric Science courses selected with adviser's approval .....                                                                                                                                                             | 7            |
| No more than 3 units of courses 192 and 199 may be counted.                                                                                                                                                                                   |              |
| <b>Restricted Electives</b> .....                                                                                                                                                                                                             | <b>21</b>    |
| Earth and planetary sciences (choose from Environmental Science and Policy 116, 150A, 150B, Geology 108N, 115N, Environmental and Resource Sciences 103, Soil Science 100, Hydrologic Science 100, 141, or courses approved by adviser) ..... | 6            |
| Coordinated group of courses (minor area) to be chosen with adviser's approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science (at least 10 upper division units) .....   | 15           |
| <b>Unrestricted Electives</b> .....                                                                                                                                                                                                           | <b>29-37</b> |
| <b>Total Units for the Degree</b> .....                                                                                                                                                                                                       | <b>180</b>   |

**Major Adviser.** S. Soong (*Land, Air and Water Resources*).

**Advising Center** for the major, as well as for graduate studies, is located in 148 Hoagland Hall in the Land, Air and Water Resources Teaching Center (530-752-1669).

### 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 as prerequisites the Mathematics 21 and 22 series and the Physics 9 series.

|                                                                                                                                                                                                             |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                             | UNITS        |
| <b>Atmospheric Science</b> .....                                                                                                                                                                            | <b>20-24</b> |
| Atmospheric Science 60, 110 .....                                                                                                                                                                           | 8            |
| Four courses selected with the approval of the minor program adviser from the following: upper division Atmospheric Science courses (excluding 192 or 199) or Environmental and Resource Sciences 131 ..... | 12-16        |

**Minor Adviser.** S-T. Soong.

**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.

\*Course not offered this academic year.



For details see under the Graduate Group in Atmospheric Science. See also the Graduate Studies section in this catalog.

**Related Courses.** See Environmental Science and Policy 150A; Physics 104A, 104B; Environmental and Resource Sciences 103, 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, 148 Hoagland Hall (530-752-1669).*

### Lower Division Courses

#### 5. Global Climate (3) II. Shelton

Lecture—2 hours; discussion—1 hour. Introduction to the climate system and global climate patterns. Emphasis on principles, concepts, and fundamental processes underlying seasonal and regional climate differences. Examination of natural and human factors contributing to climate change. GE credit: SciEng, Wrt.

**10. Severe and Unusual Weather (3) III. Shelton**  
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: Sci-Eng, Wrt.

#### 30. Issues in Atmospheric Science (2) II.

Anastasio

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.)

#### 60. Atmospheric Physics and Dynamics (4) I.

Shaw

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A and Physics 5A. 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.

#### 92. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

#### 110. Weather Observation and Analysis (4) II.

Soong

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.

#### 111. Weather Analysis and Prediction (5) I.

Grotjahn

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110, 121B, knowledge of FORTRAN (Engineering 5). Introduction to the tools used for analyzing and predicting mid-latitude weather systems. Quasi-geostrophic theory related to weather prediction and weather forecast model design and verification. Laboratory develops computer methods to illustrate topics in lecture.

#### \*115. Hydroclimatology (3) II. Shelton

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.

#### 116. Climate Change (3) II. Shelton

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.

#### 120. Atmospheric Thermodynamics and Cloud Physics (3) I. Weare

Lecture/discussion—3 hours. Prerequisite: Mathematics 21C; Physics 9A; 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.

#### 121A. Atmospheric Dynamics (3) II. Nathan

Lecture—3 hours. Prerequisite: course 120, Mathematics 21D, Physics 9B. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology.

#### 121B. Atmospheric Dynamics (3) III. Nathan

Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes; cumulus models.

#### 124. Meteorological Instruments and Observations (3) I. Paw U

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.

#### 128. Radiation and Satellite Meteorology (4) II.

Weare

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.

#### 133. Biometeorology (4) II. Paw U

Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline; Mathematics 16B and 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.

#### 149. Introduction to Air Pollution (4) I.

Anastasio, Chang, Raabe (Civil Engineering)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B, 21D; Chemistry 2B; course 121A or Engineering 103A. Examination of physical and chemical 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.)

#### 150. Computer Methods in Meteorology (4) II.

Grotjahn

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Engineering 5, Mathematics 22B, and a course in fluid dynamics (course 121A, Physics 104A or Engineering 103A), or consent of instructor. Numer-

ical techniques and their applications to meteorological problems. Finite differencing and spectral (Fourier transform) methods. Advection equation, simple forecast models, eigenvalue matrices, time series. Students will write and run FORTRAN programs to illustrate these topics.

#### 158. Boundary-Layer Meteorology (4) III. Shaw

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.

#### 160. Introduction to Atmospheric Chemistry (3) II. Anastasio

Lecture—3 hours. Prerequisite: Chemistry 2A, 2B. Quantitative examination of current local, regional, and global problems in atmospheric chemistry. Topics include photochemical smog, acid deposition, climate change, and stratospheric ozone depletion. Basic chemical modeling of atmospheric reaction systems.

#### 192. Atmospheric Science Internship (1-12) I,

II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

### Graduate Courses

#### \*200. Atmospheric Processes (3) I. Grotjahn

Lecture—3 hours. Prerequisite: Mathematics 22B-22C; Physics 9B. Advanced phenomenological and physical study of atmospheric structure and processes including radiation, statics, thermal structure and weather phenomena. Accelerated presentation of the major topics covered in courses 60, 110A-110B, 120, and 128. Credit not allowed to students having completed any two of these courses.

#### \*215. Advanced Hydroclimatology (3) III.

Shelton

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.

#### 221. Advanced Atmospheric Dynamics (3) II.

Nathan

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.

#### \*223. Advanced Boundary-Layer Meteorology (3) III. Shaw

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.

#### 230. Atmospheric Turbulence (3) III. Shaw

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.

**\*231. Advanced Air Pollution Meteorology** (3) III. Carroll

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.

**233. Advanced Biometeorology** (3) II. Paw U  
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.

**\*240. General Circulation of the Atmosphere** (3) II. Grotjahn

Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features. Offered in alternate years.

**241. Climate Dynamics** (3) I. Weare  
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.

**250. Meso-Scale Meteorology** (3) I. Soong  
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.

**\*255. Numerical Modeling of the Atmosphere** (4) III. Soong

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.

**\*260. Atmospheric Chemistry** (3) III. Anastasio  
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.

**270A-G. Topics in Atmospheric Science** (1-3) I, II, III. The Staff

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.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)  
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.)

**291A-F. Research Conference in Atmospheric Science** (1-3) I, II, III. The Staff  
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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

## Atmospheric Science (A Graduate Group)

Terrence R. Nathan, Ph.D., Chairperson of the Group (530-752-1609)

Group Office, 151 Hoagland Hall (530-752-1406)

World Wide Web: <http://lawr.ucdavis.edu/gradprg.htm>

**Faculty.** Includes eighteen faculty members from the Departments of Land, Air and Water Resources, Mechanical Engineering, Civil and Environmental Engineering, Physics, the Institute of Toxicology and Environmental Health, and Environmental Science and Policy.

**Graduate Study.** The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can 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 mesoscale 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. Considerable 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, 754-6095*).

**Graduate Admissions Officer.** T.R. Nathan (*Land, Air and Water Resources, 752-1609*).

## Avian Medicine

See **Medicine and Epidemiology**

## Avian Sciences

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Animal Science.

### 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, gamebird 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:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

|                                                                                                                                                                                                       |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                       | UNITS        |
| <b>English Composition Requirement</b> .....                                                                                                                                                          | <b>0-8</b>   |
| See College requirement                                                                                                                                                                               |              |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                               | <b>61</b>    |
| Avian sciences (Avian Sciences 11 or 13)...                                                                                                                                                           | 3-4          |
| Biological sciences (Biological Sciences 1A, 1B, 1C).....                                                                                                                                             | 15           |
| Chemistry (Chemistry 2A, 2B, 2C).....                                                                                                                                                                 | 15           |
| Chemistry (Chemistry 8A, 8B).....                                                                                                                                                                     | 6            |
| Computer science (Agricultural Systems and Environment 21).....                                                                                                                                       | 3            |
| Mathematics (Mathematics 16A, 16B, 16C)...                                                                                                                                                            | 9            |
| Physics (Physics 1A and 1B).....                                                                                                                                                                      | 6            |
| Statistics (Statistics 13).....                                                                                                                                                                       | 4            |
| <b>Breadth Subject Matter</b> .....                                                                                                                                                                   | <b>24</b>    |
| Satisfaction of General Education requirement.....                                                                                                                                                    | 24           |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                     | <b>21-24</b> |
| Biochemistry (Animal Biology 102 and 103 or Biological Sciences 102 and 103).....                                                                                                                     | 6-8          |
| Genetics (Biological Sciences 101).....                                                                                                                                                               | 4            |
| Nutrition (Nutrition 123 and Avian Sciences 150, or Nutrition 110, or Animal Biology 102 and 103).....                                                                                                | 0-5          |
| Physiology (Neurobiology, Physiology and Behavior 101).....                                                                                                                                           | 5            |
| Laboratory units in above listed subjects ...                                                                                                                                                         | 4            |
| (Recommended courses include Animal Science 135, Animal Genetics 101, Avian Sciences 103, 150L, 160, Molecular and Cellular Biology 120L, 150L, 160L, or Neurobiology, Physiology and Behavior 101L.) |              |
| <b>Restricted Electives</b> .....                                                                                                                                                                     | <b>31</b>    |
| Specialized courses related to avian species to supplement or expand depth subject matter courses.                                                                                                    |              |
| <b>Unrestricted Electives</b> .....                                                                                                                                                                   | <b>26-41</b> |
| <b>Total Units for the Degree</b> .....                                                                                                                                                               | <b>180</b>   |

**Major Adviser.** K.L. Radke.

**Advising Center** for the major is located in 1202 Meyer Hall (530-752-6118).

### Minor Program Requirements:

|                                                                                      |           |
|--------------------------------------------------------------------------------------|-----------|
|                                                                                      | UNITS     |
| <b>Avian Sciences</b> .....                                                          | <b>18</b> |
| 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, Animal |           |

\*Course not offered this academic year.

Science 143, Evolution and Ecology 137, Neurobiology, Physiology and Behavior 117, Wildlife, Fish and Conservation Biology 111.

**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 the Graduate Group in Avian Sciences. See also the Graduate Studies section in this catalog.

**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.

**Advising** for the major, minor, or the following courses is located in the Animal Science Advising Center, 1202 Meyer Hall (530-752-6118).

## Courses in Avian Sciences (AVS)

### Lower Division Courses

#### 11. Introduction to Poultry Science (3) II.

Bradley

Lecture—3 hours; one field trip required. 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. GE credit: SciEng, Wrt.

#### 13. Birds, Humans and the Environment (3) I.

Wilson, Morzenti

Lecture—2 hours; discussion—1 hour; half-day field trip. 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. GE credit: SciEng, Wrt.

#### \*14L. Management of Captive Birds (2) II.

Morzenti

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) I, III.

Morzenti

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.

#### \*16LA-16LB-16LC. Raptor Migration and Population Fluctuations (2-2-2) I-II-III.

Morzenti  
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.

#### 92. Internship in the Avian Sciences (1-12) I, II, III.

The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Internship on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Problems in avian biology; nutrition, breeding, and physiology of poultry/wild birds and their products. (P/NP grading only.)

### Upper Division Courses

#### 100. Avian Biology (3) I. Weathers

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) I.

Delany

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101, Molecular and Cell Biology 150. Unique features of avian development and genetics. Development topics: gametogenesis, fertilization, pre- and post ovipositional development, morphogenesis, sex differentiation, specialized organ systems, incubations, hatching. Genetic topics: genome organization, inheritance, sex determination, avian models. Laboratory exercises: embryology, genetics, model systems.

#### 115. Raptor Biology (3) II. Morzenti

Lecture—3 hours; two Saturday field trips. 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.

#### 121. Avian Reproduction (2) II. Millam

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.

#### \*123. Management of Birds (3) II. Millam

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.

#### 149. Egg Production Management (2) III. Ernst

Lecture—2 hours; one Saturday field trip required. 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. Offered in alternate years.

#### \*150. Nutrition of Birds (1) III. Klasing

Lecture—1 hour. Prerequisite: Nutrition 110 (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.

#### \*150L. Nutrition of Birds Laboratory (2) III. King

Laboratory—6 hours. Prerequisite: course 150. Feeding trials to show nutrient requirements. Metabolizable energy study and proximate analysis of feed. Determination of vitamins, minerals, fatty acids and other nutrients or substances in feed with emphasis on use of laboratory equipment.

#### 160. Designing and Performing Experiments in Avian Sciences (2) I, II, III. The Staff

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. Student choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor.

#### 170. Advanced Avian Biology (4) II. Weathers

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) I, II, III.

The Staff

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.)

#### 192. Internship in Avian Sciences (1-12) I, II, III.

The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

#### 195. Topics in Current Research (1-3) I, II, III.

The Staff (Chairperson in charge)

Lecture/discussion—variable. Hours will depend on instructor with the number of units being commensurate with time in class. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.

#### 197T. Tutoring in Avian Sciences (1-3) I, II, III.

The Staff (Chairperson in charge)

Hours and duties vary depending upon course being tutored. 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 course; written critiques of teaching procedures. (P/NP grading only.)

#### 198. Directed Group Study (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

#### 220. Cellular Proliferation and Oncogenes (4) I.

Radke, Oberbauer

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, 102, 103, 104; Genetics Graduate Group 201C or Molecular and Cellular Biology 221D or Microbiology 200C recommended. Regulation of growth and division of animal cells. The cell cycle, oncogenes, retroviruses and growth factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are emphasized.

#### 290. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

#### 290C. Research Conference (1) I, II, III. The Staff

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.)

#### 297T. Supervised Teaching in Avian Sciences (1-4) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor.

#### 299. Research (1-12) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)



## Avian Sciences (A Graduate Group)

J. R. Millam, Ph.D., Chairperson of the Group  
Group Office, 1202B Meyer Hall (530-752-2382)  
World Wide Web:  
<http://etx.ucdavis.edu/avs/avsdept.htm>

**Faculty.** Consists of members from several departments in the College of Agricultural and Environmental Sciences, Division of Biological Sciences, and the School of Veterinary Medicine.

**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 at present include nutrition, physiology, reproduction, pathology, 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.** C.C. Calvert (*Animal Sciences*).

## Biochemistry

See **Biological Sciences—Molecular and Cellular Biology; Biochemistry and Molecular Biology; Biophysics**

## Biochemistry and Molecular Biology (A Graduate Group)

Michael E. Dahmus, Ph.D., Chairperson of the Group  
Group Office, 188 Briggs Hall (530-752-9091)  
World Wide Web:  
<http://www-ggc.ucdavis.edu/ggc/bmb>

**Faculty.** Members of the group include faculty from the Colleges of Agricultural and Environmental Sciences and of Letters and Science, as well as the Schools of Medicine and of Veterinary Medicine.

**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.** E. Bandman (*Food Science and Technology*), D.J. Klionsky (*Microbiology*), P. Ronald (*Plant Pathology*), R. Fairclough (*Neurology*).

## Courses in Biochemistry and Molecular Biology (BMB)

### Graduate Courses

**290. Seminar** (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (S/U grading only.)

## Biological Chemistry

See **Medicine, School of**

## Biological and Agricultural Engineering

(College of Agricultural and Environmental Sciences)  
David J. Hills, Ph.D., Chairperson of the Department  
Department Office, 2030 Bainer Hall (530-752-0102)  
World Wide Web: <http://www.engr.ucdavis.edu/~bae>

### Faculty

Pictiaw (Paul) Chen, Ph.D., Professor  
Michael J. Delwiche, Ph.D., Professor  
D. Ken Giles, Ph.D., Professor  
Mark E. Grismer, Ph.D., Professor  
Bruce R. Hartsough, Ph.D., Professor  
David J. Hills, Ph.D., Professor  
Bryan M. Jenkins, Ph.D., Professor  
John M. Krochta, Ph.D., Professor  
Miguel A. Mariño, Ph.D., Professor  
Kathryn McCarthy, Ph.D., Associate Professor  
Michael J. McCarthy, Ph.D., Professor  
John A. Miles, Ph.D., Professor  
Ning Pan, Ph.D., Associate Professor  
Raul H. Piedrahita, Ph.D., Associate Professor  
Richard E. Plant, Ph.D., Professor  
James W. Rumsey, Ph.D., Lecturer  
Thomas R. Rumsey, Ph.D., Professor  
R. Paul Singh, Ph.D., Professor  
David C. Slaughter, Ph.D., Associate Professor  
Shrinivasa K. Upadhyaya, Ph.D., Professor  
Jean S. VanderGheynst, Ph.D., Assistant Professor  
Wesley W. Wallender, Ph.D., Professor  
Ruihong Zhang, Ph.D., Assistant Professor

### Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus  
William J. Chancellor, Ph.D., Professor Emeritus  
Robert B. Fridley, Ph.D., Professor Emeritus  
Roger E. Garrett, Ph.D., Professor Emeritus  
John R. Goss, M.S., Professor Emeritus  
George F. Hanna, M.Ed., Lecturer Emeritus  
S. Milton Henderson, M.S., Sc.D., Professor Emeritus  
Robert A. Kepner, B.S., Professor Emeritus  
Coby Lorenzen, Jr., M.S., Professor Emeritus  
R. Larry Merson, Ph.D., Professor Emeritus  
Stanton R. Morrison, Ph.D., Professor Emeritus  
Michael O'Brien, Ph.D., Professor Emeritus  
Henry E. Studer, M.S., Professor Emeritus  
Wesley E. Yates, M.S., Professor Emeritus

### Affiliated Faculty

James M. Myers, Ph.D., Extension Specialist  
William E. Steinke, Ph.D., Extension Specialist  
James F. Thompson, M.S., Extension Specialist

**Major Programs and Graduate Study.** For the Bachelor of Science program see the major in Engineering; for graduate study see the Graduate Studies chapter in this catalog.

**Minor Programs.** The Department of Biological and Agricultural Engineering offers three minors through the College of Agricultural and Environmental Sciences: **Applied Biological Systems Technology**, **Geographic Information Systems** and **Precision Agriculture**.

The Applied Biological Systems program is for non-engineering students interested in engineering terminology and procedures. Course work provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.

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 Agricultural and Environmental Sciences and College of Letters and Science)

Mark G. McNamee, Ph.D., Dean of Biological Sciences

Thomas L. Rost, Ph.D., Associate Dean

Division Office, 202 Life Sciences Addition  
(530-752-0410)

World Wide Web: <http://www.dbs.ucdavis.edu>

The intercollege Division of Biological Sciences coordinates campuswide programs in basic biology and administers undergraduate programs in the core disciplines of biology on behalf of the College of Agricultural and Environmental Sciences and the College of Letters and Science.

The division has five sections that represent the major themes of modern biology: Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. Core courses in biological sciences, the Biological Sciences major, and the Bodega Marine Laboratory Program are offered jointly by the sections of the division. Each section also offers courses and one or more majors focusing on the core disciplines.

### Faculty

All faculty are primary members of one section and some faculty are secondary members of a second section as well. See "Sections of the Division," following, for a list of faculty in each section.

### The Major Programs

Four majors leading to an A.B. degree are offered in:

**Biological Sciences**  
**Evolution and Ecology**  
**Microbiology**  
**Plant Biology**

Eight majors leading to a B.S. degree are offered in:

**Biochemistry**  
**Biological Sciences**  
**Cell Biology**  
**Evolution and Ecology**  
**Genetics**  
**Microbiology**  
**Neurobiology, Physiology and Behavior**  
**Plant Biology**

**Choice of College.** The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by both the



College of Letters and Science and the College of Agricultural and Environmental Sciences. The major requirements are the same in each college, but there are differences in the college requirements and policies. See the Undergraduate Education chapter college sections in this catalog for more information.

**Student Services.** Student affairs officers at the division's Dean's Office, 202 Life Sciences Addition, and advising staff in section offices provide information and counseling on the major programs and courses offered by the division.

### The Biological Sciences Major

(Sections 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 sections of the division. 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 biotechnical research with various governmental agencies or private companies, government regulation agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

The B.A. 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        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                   | <b>40-53</b> |
| Biological Sciences 1A-1B-1C.....                                                                                                                         | 15           |
| 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 16A-16B.                                                                                                        |              |
| <b>Depth Subject Matter</b> .....                                                                                                                         | <b>38-47</b> |
| Biological Sciences 101 and 102.....                                                                                                                      | 7            |
| One course in evolution from Evolution and Ecology 100, 140; Geology 107; Plant Biology 116.....                                                          | 4            |
| One course in ecology from Environmental Science and Policy 100; Evolution and Ecology 101, 121; Evolution and Ecology/Plant Biology 117.....             | 3-4          |
| One course in philosophy of science from History and Philosophy of Science 130A, 130B; Philosophy 108.....                                                | 4            |
| One course in physiology 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.....                                                                                             | 9-15         |
| <i>Animal diversity:</i>                                                                                                                                  |              |
| Entomology 100, 107, 109; Evolution and Ecology 105, 112, 134, 137; Nematology 110; Wildlife, Fish and Conservation Biology 110, 111, 120.                |              |
| <i>Microbial diversity:</i>                                                                                                                               |              |
| Microbiology 105, 162; Pathology, Micro-                                                                                                                  |              |

biology and Immunology 127, 128; Plant Biology 118, 148; Soil Science 111.

*Plant diversity:*  
Evolution and Ecology 121, 140; Plant Biology 102, 108, 116, 121.

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 courses may be listed in more than one category, each course may be offered in satisfaction of only one requirement.**

**Total units for the major** .....78-100

### B.S. Major Requirements:

|                                                                                                                                                                                                                                                                               |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                               | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                       | <b>60-67</b> |
| Mathematics 16A-16B-16C.....                                                                                                                                                                                                                                                  | 9            |
| Chemistry 2A-2B-2C.....                                                                                                                                                                                                                                                       | 15           |
| Chemistry 8A-8B or 118A-118B-118C.....                                                                                                                                                                                                                                        | 6-12         |
| Biological Sciences 1A-1B-1C.....                                                                                                                                                                                                                                             | 15           |
| Statistics 13, 32, 100, or 102.....                                                                                                                                                                                                                                           | 3-4          |
| Physics 7A-7B-7C.....                                                                                                                                                                                                                                                         | 12           |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                             | <b>45</b>    |
| Biological Sciences 101, 102, 103, 104.....                                                                                                                                                                                                                                   | 13           |
| Restricted Electives.....                                                                                                                                                                                                                                                     | 32           |
| <b>Breadth in the major</b> is achieved by completing at least one course from each of the five field requirement lists, (a) through (e), below. See your area of emphasis for any specific course requirements.                                                              |              |
| <b>Depth in the major</b> is achieved by completing one area of emphasis listed below and additional upper division biology courses (see "Approved Biology Electives" list), as needed, to total to 32 units. See your faculty adviser regarding the choice of those courses. |              |
| Depth in the major must include at least 2 units (or 6 hours per week) of laboratory designated in the area of emphasis.                                                                                                                                                      |              |
| <b>Note: Although courses may be listed in more than one category, each course may be offered in satisfaction of only one requirement.</b>                                                                                                                                    |              |
| <b>Field Requirement Course List (Breadth):</b>                                                                                                                                                                                                                               |              |
| (a) <i>Evolution:</i> Anthropology 151, 152, 154A; Evolution and Ecology 100; Geology 107; Plant Biology 143.....                                                                                                                                                             | 3-5          |
| (b) <i>Ecology:</i> Anthropology 154B; Biological Sciences 122; Entomology 104, 156; Environmental Science and Policy 100, 121; Evolution and Ecology 101; Microbiology 120; Wildlife, Fish and Conservation Biology 151.....                                                 | 3-4          |
| (c) <i>Microbiology:</i> Food Science and Technology 104; Microbiology 102, 140, 150, 162; Pathology, Microbiology and Immunology 127, 128; Soil Science 111.....                                                                                                             | 3-5          |
| (d) <i>Neurobiology, physiology and behavior:</i> Anthropology 154A, 154B; Entomology 102, 104; Neurobiology, Physiology and Behavior 100, 101, 102, 141.....                                                                                                                 | 3-5          |
| (e) <i>Plant biology:</i> Environmental Horticulture 102, 105; Evolution and Ecology 117, 121, 140; Plant Biology 102, 105, 108, 111, 112, 113, 116, 117, 118, 121, 143, 144, 148, 176; Plant Pathology 120, 130.....                                                         | 3-5          |
| <b>Areas of Emphasis (Depth):</b>                                                                                                                                                                                                                                             |              |
| <b>Evolution and Ecology</b> emphasis.....                                                                                                                                                                                                                                    | <b>12-18</b> |
| Field requirement: Students must take Evolution and Ecology 100 to satisfy Field requirement (a), and Evolution and Ecology 101 to satisfy Field requirement (b). Evolution and Ecology 102 or 103.....                                                                       | 3-4          |

Biodiversity, six or more units, to include at least two units (or 6 hours per week) of laboratory, from the following: Entomology 100, 100L, 107, 109; Evolution and Ecology 112, 112L, 121, 134, 134L, 137, 137L; Geology 107, 107L; Microbiology 105; Nematology 110; Plant Biology 102, 108, 118, 148; Wildlife, Fish and Conservation Biology 110, 110L, 111, 111L, 120, 120L.....6-9

Restricted electives.....3-5

Select one course from: Biological Sciences 122, 122P; Entomology 103, 104, 156, 156L; Environmental Science and Policy 121, 123, 150A, 150B, 150C, 151, 151L; Evolution and Ecology 105, 117, 138, 140, 141, 147, 149, 170, 170L; Geology 107, 107L; Nematology 100; Neurobiology, Physiology and Behavior 102; Philosophy 108; Plant Biology 116, 117, 121; Wildlife, Fish and Conservation Biology 136.

### Microbiology emphasis.....13-15

Field requirement: Students must take Microbiology 102 to satisfy Field requirement (c).

Laboratory requirement: Students must take Microbiology 102L to satisfy the restricted elective lab requirement.

Clusters: Complete one of the four clusters (a-d) below, **or** complete an individual cluster with approval from your faculty adviser.

(a) *Microbial Physiology and Molecular Genetics*  
Microbiology 102L.....2  
Select two courses from Microbiology 140, 150, 160.....6  
Select six or more units from: Microbiology 155L, 177; Molecular and Cellular Biology 121, 123, 141, 161.....6

(b) *Microbial Diversity and Ecology*  
Microbiology 102L, 105, 162.....11  
Select three or more units from: Microbiology 120, 120L; Plant Biology 118; Soil Science 111.....3

(c) *Biotechnology and Applied Microbiology*  
Microbiology 102L.....2  
Microbiology 140 or 150.....3  
Select one course from: Food Science and Technology 102A, 104, or Viticulture and Enology 186.....3-4  
Select six or more units from: Chemical Engineering 161A; Microbiology 110, 155L; Molecular and Cellular Biology 121, 122, 123, 170L.....6

(d) *Medical Microbiology*  
Microbiology 102L.....2  
Pathology, Microbiology and Immunology 127 or Medical Microbiology 115-116.....5  
Microbiology 162 or Pathology, Microbiology and Immunology 128.....3-4  
Medical Microbiology 107 or Pathology, Microbiology and Immunology 126.....3-4

### Molecular and Cellular Biology emphasis....12-18

Molecular biology and gene expression: one course from Molecular and Cellular Biology 121, 141, 161.....3-4

Laboratory experience: one or more laboratory courses from Biological Sciences 120P; Molecular and Cellular Biology 120L, 140L, 160L; or other laboratory course that emphasizes cellular or molecular biology with approval of your adviser.....3-6

Restricted electives.....6-8

Select two or more courses from Biological Sciences 120; Medical Microbiology 107; Molecular and Cellular Biology 122, 123, 126, 141, 142, 150, 151L, 162, 163;

## 158 Biological Sciences (Major Programs)

Neurobiology, Physiology and Behavior 103; Pathology, Microbiology and Immunology 126; Plant Biology 113, 126; or other courses with adviser's approval.

### Neurobiology, Physiology and Behavior emphasis.....15

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, 163; Psychology 108, 124, 163.

#### (2) Physiology:

Entomology 102; Evolution and Ecology 170, 170L; Exercise Science 101, 101L, 102, 110, 111; Medical Microbiology 107; Neurobiology, Physiology and Behavior 101, 101L, 103, 104L, 105, 106\*, 111C, 111L, 113, 114, 117, 119, 119L, 121, 121L, 127, 128, 130, 140, 141, 141P; Pathology, Microbiology and Immunology 126; Wildlife, Fish and Conservation Biology 121.

#### (3) Behavior:

Anthropology 154A, 154B; Entomology 104; Neurobiology, Physiology and Behavior 102, 150, 152; Psychology 150.

\***Note:** Neurobiology, Physiology and Behavior 106 may be used only once to satisfy Area of Emphasis requirements.

### Plant Biology emphasis .....13-16

Select one course from each of the following four areas and include one laboratory course from Plant Biology 105, 108, 111L, 116, 118, 148, 161A, 161B; or two laboratory courses from Evolution and Ecology 140, Plant Biology 153, 158, 171, 172L.

#### (1) Anatomy and morphology:

Evolution and Ecology 140; Plant Biology 105, 116, 118.....4-5

#### (2) Physiology and development:

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) Applied plant biology:

Agricultural Systems and Environment 110A; Plant Biology 154, 160, 171, 172, 175.....3-4

### Total Units for the Major .....105-112

### Approved Biology Electives

These are courses which 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.

Agricultural Systems and Environment 135

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 105, 107

Environmental Science and Policy 100, 110, 121, 123, 124, 150C, 151, 151L

Evolution and Ecology—All upper division courses

Exercise Science 101, 102, 110, 111, 113

Geology 107, 107L, 150C

Medical Microbiology 107, 115

Microbiology—All upper division courses

Molecular and Cellular Biology—All upper division courses

Nematology 100, 110

Neurobiology, Physiology and Behavior—All upper division courses

Nutrition 101, 110, 111

Pathology, Microbiology and Immunology 101, 101L, 102, 126, 126L, 127, 128

Philosophy 108

Plant Biology—All upper division courses, except 188

Plant Pathology 120, 130

Psychology 108, 150

Wildlife, Fish and Conservation Biology 110, 111, 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:

The minor in Biological Sciences acquaints students with the range and variety of modern biology, including work in two or three areas: animal biology, plant biology, and microbiology; and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and biochemistry and cell biology. The list of required courses is restricted to those that are acceptable for the major program in Biological Sciences but which do not require extensive upper division preparatory work. Substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

### UNITS

### Biological Sciences .....24

Biological Sciences 1C .....5

Biological Sciences 101 .....4

Additional upper division units (as specified in the area requirements and group requirements below) .....15

**Area Requirement:** one course in two of the area requirements below: animal biology, microbiology, and plant biology.

#### (a) Animal biology:

Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120, 122; Cell Biology and Human Anatomy 101; Entomology 101, 102, 103, 104, 109, 116, 119, 153; Environmental Science and Policy 129; Evolution and Ecology 100, 101, 105, 112, 133, 134, 136, 137, 138, 147, 149, 170; Geology 111A; Molecular and Cellular Biology 150; Nematology 110; Neurobiology, Physiology and Behavior 102; Wildlife, Fish and Conservation Biology 110, 111, 120, 140, 151.

#### (b) Microbiology:

Entomology 156; Geology 111B; Medical Microbiology 107; all upper division Microbiology courses (excluding 190–199); Plant Biology 118, 119; Plant Pathology 120, 130; Veterinary Microbiology and Immunology 126, 127, 128, 132.

#### (c) Plant biology:

Environmental Horticulture 105, 107; Evolution and Ecology 121, 140, 144; all upper division Plant Biology courses, excluding 190–199 and Botany/Zoology 130; Plant Science 101, 103; Range Science 100; Vegetable Crops 105.

**Note:** Plant Biology 118 or 119 may be used for either microbiology or plant biology (not both).

**Group Requirement:** at least one course or course sequence from four of the five group requirements below:

#### (a) Organismal biology:

Evolution and Ecology 112, 136, 137; Microbiology 105; Molecular and Cellular Biology 150; Plant Biology 102, 105.

#### (b) Population biology and ecology:

Anthropology 154A; Environmental Science and Policy 100; Evolution and Ecology 101, 121; Wildlife, Fish and Conservation Biology 151.

(c) *Evolutionary biology:* Anthropology 151; Evolution and Ecology 100, 140, 149; Geology 107; Plant Biology 116.

#### (d) *Physiology:*

Neurobiology, Physiology and Behavior 101; Plant Biology 111, 112.

#### (e) *Biochemistry and cell biology:*

Biological Sciences 102 and 103, 104; Molecular and Cellular Biology 141.

**Note:** A course that appears on both the area and group requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

**Advisers and Advising:** Information on the Biological Sciences major or minor can be obtained from the Undergraduate Academic Programs Office, 202 Life Sciences Addition.

**Honors and Honors Programs.** Students who have met the minimum grade point average and the units-completed criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Division of Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194H.

The division additionally recommends students to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation.

**Citation for Outstanding Performance.** The Division 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 Dean (Biological Sciences). See also the Teacher Education Program.

## Majors in the Core Disciplines of Biology

### The Biochemistry Major Program

(Section of Molecular and Cellular Biology)

The Biochemistry 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 biochemistry a rewarding field of study.

**The Program.** The biochemistry program begins with the four-course, upper division common curriculum that provides an introduction to the principles of biochemistry, genetics, and cell biology. Biochemistry 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 examine detailed aspects of modern biochemistry. Students also are required to take courses in other biological sciences and a full year of physical chemistry.

**Career Alternatives.** The biochemistry 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 biomedical, biotechnology, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

**B.S. Major Requirements:**

|                                                                                                                                                                                                                                   |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                   | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                           | <b>54-58</b> |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                                                                | 15           |
| Chemistry 2A-2B-2C .....                                                                                                                                                                                                          | 15           |
| Mathematics 16A-16B-16C or 21A-21B-21C .....                                                                                                                                                                                      | 9-12         |
| Physics 7A-7B-7C .....                                                                                                                                                                                                            | 12           |
| Statistics 13, 32, 100 or 102.....                                                                                                                                                                                                | 3-4          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                 | <b>53-54</b> |
| Biological Sciences 101, 102, 103, 104.....                                                                                                                                                                                       | 13           |
| Chemistry 118A-118B-118C or 128A-128B-128C, 129A-129B .....                                                                                                                                                                       | 12-13        |
| Chemistry 107A-107B-108.....                                                                                                                                                                                                      | 9            |
| Molecular and Cellular Biology 120L, 121, 122, 123 .....                                                                                                                                                                          | 15           |
| Restricted Electives.....                                                                                                                                                                                                         | 4            |
| Upper division courses in biological sciences or chemistry. Students are encouraged to obtain additional laboratory experience; however, no more than 3 units of 192, 193 or 199 may be counted toward Restricted Elective units. |              |

**Total Units for the Major**.....**107-112**

**Master Adviser.** L.R. Sprechman (*Section of Molecular and Cellular Biology*), 126 Briggs Hall.

**Advising Center** for the major is located in 156 Briggs (530-752-9032).

**Graduate Study.** See Biochemistry and Molecular Biology (A Graduate Group); and the Graduate Studies chapter of this catalog.

**The Cell Biology Major Program**

(Section of Molecular and Cellular Biology)

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 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 major illustrates the ways in which principles derived from the physical sciences, genetics, biochemistry 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, medical or veterinary sciences, for students pursuing careers involving teaching or research in the biological sciences or careers related to the administrative, legal or commercial aspects of biomedical science.

**B.S. Major Requirements:**

|                                                                                                                                                         |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                         | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                 | <b>55</b>    |
| Biological Sciences 1A-1B-1C .....                                                                                                                      | 15           |
| Chemistry 2A-2B-2C .....                                                                                                                                | 15           |
| Mathematics 16A-16B-16C .....                                                                                                                           | 9            |
| Physics 7A-7B-7C .....                                                                                                                                  | 12           |
| Statistics 13 or 100 (recommended).....                                                                                                                 | 4            |
| <b>Depth Subject Matter</b> .....                                                                                                                       | <b>53-58</b> |
| Biological Sciences 101, 102, 103, 104.....                                                                                                             | 13           |
| Chemistry 118A-118B-118C .....                                                                                                                          | 12           |
| Chemistry 107A-107B .....                                                                                                                               | 6            |
| Molecular and Cellular Biology 140L, 150, 150L .....                                                                                                    | 9            |
| Molecular and Cellular Biology 141 (recommended) or 121 or 161 .....                                                                                    | 3-4          |
| One additional upper division laboratory course from: Molecular and Cellular Biology 120L, 151L, 160L; Neurobiology, Physiology and Behavior 160L ..... | 4-6          |

Two additional courses from: Chemistry 108; Molecular and Cellular Biology 142, 146, 163; Neurobiology, Physiology and Behavior 160; Pathology, Microbiology, and Immunology 126; Plant Biology 125; or other courses in cell biology with the approval of the master adviser.....6-8

**Total Units for the Major**.....**108-113**

**Master Adviser.** D.G. Myles (Molecular and Cellular Biology), 3167 Life Sciences Addition.

**Advising Center** for the major is located in 156 Briggs (530-752-0202).

**The Evolution and Ecology Major Program**

(Section of Evolution and Ecology)

The major in Evolution and Ecology 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 Evolution and Ecology major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in evolution and ecology and various more specialized courses that allow the student to focus his or her studies. Evolution and Ecology 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 and ecology 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, or business.

**A.B. Major Requirements:**

|                                                                                                                                                    |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                    | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                            | <b>41-45</b> |
| Biological Sciences 1A-1B-1C .....                                                                                                                 | 15           |
| Chemistry 2A-2B, 8A-8B .....                                                                                                                       | 16           |
| Mathematics 16A-16B or Statistics 102.....                                                                                                         | 4-6          |
| Physics 1A-1B or 7B-7C .....                                                                                                                       | 6-8          |
| <b>Depth Subject Matter</b> .....                                                                                                                  | <b>36</b>    |
| Biological Sciences 101 .....                                                                                                                      | 4            |
| Biological Sciences 104 or Botany/Zoology 130 (fall quarter 1993 only) or Zoology 121A and Molecular and Cellular Biology 141 (1993-94 only) ..... | 4-8          |
| One course from Anthropology 151; Evolution and Ecology 100; Geology 107, 111A .....                                                               | 3-4          |
| Additional upper division course work in biological science to achieve a total of 36 or more units .....                                           | 20-25        |
| Include at least 15 units in Evolution and Ecology (or Zoology) and one course from two of the four areas of study (a-d).                          |              |
| <i>(a) Ecology and behavior:</i>                                                                                                                   |              |
| Environmental Science and Policy 100; Evolution and Ecology 101, 147, 149; Neurobiology, Physiology and Behavior 102.                              |              |
| <i>(b) Systematics, morphology, and natural history:</i>                                                                                           |              |
| Entomology 100; Evolution and Ecology 105, 112, 133, 134, 134L, 136, 136L, 137, 137L.                                                              |              |
| <i>(c) Developmental biology:</i>                                                                                                                  |              |
| Molecular and Cellular Biology 150, 150L, 151.                                                                                                     |              |

*(d) Physiology:*  
Molecular and Cellular Biology 142; Neurobiology, Physiology and Behavior 110, 110L, 142, 142L, 143.

**Note:** A maximum of 5 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

**Total Units for the Major**.....**77-81**

**Recommended**

Biological Sciences 102-103; Geology 3; Physics 7A.

**B.S. Major Requirements:**

|                                                                                                                       |              |
|-----------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                       | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                               | <b>57-66</b> |
| Biological Sciences 1A-1B-1C .....                                                                                    | 15           |
| 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           |
| <b>Depth Subject Matter</b> .....                                                                                     | <b>49</b>    |
| Biological Sciences 101, 102, 103, 104.....                                                                           | 13           |
| Evolution and Ecology 100, 101, and 102 or 103 .....                                                                  | 11-12        |
| Statistics 100 or 102 or 130A-130B .....                                                                              | 4-8          |
| Additional upper division course work in biological science to achieve a total of 49 or more units .....              | 16-21        |
| Include at least 2 units (6 hours per week) of laboratory and one course from each of the areas of study below (a-b). |              |

*(a) Biodiversity:*  
Entomology 100, 100L, 107, 109; Environmental Science and Policy 124; Evolution and Ecology 112, 112L, 121, 134, 134L, 137, 137L; Plant Biology 108, 118, 148; Wildlife, Fish and Conservation Biology 110, 110L, 111, 111L, 120, 120L.

*(b) Physiology and functional morphology:*  
Anatomy, Physiology and Cell Biology 100; Avian Sciences 100; Entomology 101, 102; Environmental Science and Policy 129, 129L; Evolution and Ecology 105, 170, 170L; Neurobiology, Physiology and Behavior 101, 141, 141P; Plant Biology 111, 111L, 112, 116; Wildlife, Fish and Conservation Biology 121.

**Note:** A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

**Total Units for the Major**.....**106-115**

**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, 115
- Environmental Science and Policy 110, 116, 121, 123, 150C, 151, 151L
- Geology 106, 107, 107L, 145, 146, 150C



## 160 Biological Sciences (Major Programs)

Microbiology, all upper division courses  
Molecular and Cellular Biology, all upper division courses  
Nematology 110  
Neurobiology, Physiology and Behavior, all upper division courses  
Nutrition 110, 111  
Pathology, Microbiology and Immunology 101, 101L, 126, 126L, 128  
Philosophy 108  
Plant Biology, all upper division courses  
Psychology 108, 129, 134, 150  
Wildlife, Fish and Conservation Biology 120, 120L, 121

**Major Advisers.** Students transferring to Davis from another institution and majoring in evolution and ecology 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 Section 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, 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 Department of Education in regard to preparation for certification. See also the section on the Teacher Education Program.

### The Genetics Major Program

(Section of Molecular and Cellular Biology)

The Genetics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity 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 common 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, and human genetics, as well as a laboratory course in the principles of genetics. Additional upper division courses in biological sciences are required, including a second laboratory course.

**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 enter a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

### B.S. Major Requirements:

UNITS

|                                                                                                       |              |
|-------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                               | <b>60-70</b> |
| Biological Sciences 1A-1B-1C .....                                                                    | 15           |
| 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           |
| Statistics 13, 32, 100, or 102.....                                                                   | 3-4          |
| <b>Depth Subject Matter</b> .....                                                                     | <b>50-51</b> |
| Biological Sciences 101, 102, 103, 104.....                                                           | 13           |
| Molecular and Cellular Biology 160L, 162, 163, 164 .....                                              | 13           |
| Evolution and Ecology 100.....                                                                        | 4            |
| One course from the following: Molecular and Cellular Biology 121, 141, 161 .....                     | 3-4          |
| One course from the following: Microbiology 102-102L; Molecular and Cellular Biology 120L, 170L ..... | 6            |

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 can be used for credit in this category.

**Total Units for the Major**.....**110-121**

**Master Adviser.** Contact R.S. Hawley (Molecular and Cellular Biology), 345 Briggs Hall.

**Advising Center** for the major is located in 156 Briggs Hall (530-752-0202).

**Graduate Study.** The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics.

### The Microbiology Major Program

(Section of Microbiology)

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.** Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. degree program emphasizes the biology of bacteria, while the B.S. degree program includes more biochemistry and related course work. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine or various allied health professions including medical technology, or teaching. The B.S. program is especially well suited for students who want a professional career in microbiology, or who wish to pursue graduate education in a biological science discipline. 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 is excellent preparation for a career in biotechnology, pharmacology, agriculture, and the food industry. It also provides a strong background for students wishing to continue on to professional studies in medicine and the other health sciences.

### A.B. Major Requirements:

UNITS

|                                                                                                                                                                                                   |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                           | <b>47-61</b>  |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                                | 15            |
| Chemistry 2A-2B .....                                                                                                                                                                             | 10            |
| Chemistry 8A-8B or 118A-118B-118C ...                                                                                                                                                             | 6-12          |
| Mathematics 16A-16B or 21A-21B .....                                                                                                                                                              | 6-8           |
| Physics 1A-1B or 7A-7B-7C .....                                                                                                                                                                   | 6-12          |
| Statistics 13 .....                                                                                                                                                                               | 4             |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                 | <b>38-40</b>  |
| Biological Sciences 102, 103.....                                                                                                                                                                 | 6             |
| Microbiology 102, 102L, 105, 130A .....                                                                                                                                                           | 14            |
| Microbiology 162 or Pathology, Microbiology and Immunology 128 .....                                                                                                                              | 3-4           |
| Two of the following: Microbiology 120-120L, 130B-130L, 177-177L .....                                                                                                                            | 10-11         |
| Additional units from Microbiology 110, 120, 120L, 130B, 130L, 177, 177L; Molecular and Cellular Biology 120L; Pathology, Microbiology and Immunology 126, 127; Plant Biology 114, 118, 119 ..... | 5             |
| <b>Total Units for the Major</b> .....                                                                                                                                                            | <b>85-101</b> |

### B.S. Major Requirements:

UNITS

|                                                                                                                                                                                                                                                                                          |                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                  | <b>60-67</b>   |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                                                                                                                       | 15             |
| Chemistry 2A-2B-2C .....                                                                                                                                                                                                                                                                 | 15             |
| Chemistry 8A-8B or 118A-118B-118C ...                                                                                                                                                                                                                                                    | 6-12           |
| Mathematics 16A-16B-16C .....                                                                                                                                                                                                                                                            | 9              |
| Physics 7A-7B-7C .....                                                                                                                                                                                                                                                                   | 12             |
| Statistics 13, 32, 100 or 102.....                                                                                                                                                                                                                                                       | 3-4            |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                        | <b>45-52</b>   |
| Biological Sciences 101, 102, 103, 104.....                                                                                                                                                                                                                                              | 13             |
| Molecular and Cellular Biology 120L .....                                                                                                                                                                                                                                                | 6              |
| Microbiology 102, 102L, 105.....                                                                                                                                                                                                                                                         | 11             |
| Two courses from Microbiology 140, 150 or 160 .....                                                                                                                                                                                                                                      | 6              |
| Microbiology 162 or Pathology, Microbiology and Immunology 128 .....                                                                                                                                                                                                                     | 3-4            |
| One of the following: Food Science and Technology 104-104L; Microbiology 120-120L, 155L, 177-177L; Molecular and Cellular Biology 161-170L; Pathology, Microbiology and Immunology 127; Soil Science 111 .....                                                                           | 3-9            |
| Three additional units from Food Science and Technology 104, 104L; Medical Microbiology 107; Microbiology 110, 120, 120L, 155L, 177, 177L, 199; Molecular and Cellular Biology 161, 170L; Pathology, Microbiology and Immunology 126, 127; Plant Biology 118, 148; Soil Science 111..... | 3              |
| <b>Total Units for the Major</b> .....                                                                                                                                                                                                                                                   | <b>105-119</b> |

**Master Adviser.** M.L. Wheelis (Section of Microbiology), 2202 Storer Hall.

**Honors and Honors Program.** M.L. Wheelis.

**Teaching Credential Subject Representative.** M.L. Wheelis. See also the Teacher Education Program.

**Graduate Study.** The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in microbiology.

For detailed information regarding graduate study in microbiology, address the Graduate Group Chairperson, Section of Microbiology.

**Related Courses.** The offerings of the Section of Microbiology are augmented by courses and faculty of Evolution and Ecology; Food Science and Technology; Land, Air, and Water Resources; Medical Microbiology; Medicine and Epidemiology; Molecular and Cellular Biology; Pathology, Microbiology and Immunology; Plant Biology; Plant Pathology; Viticulture and Enology.

Faculty of the Section of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10, and 19.

### The Neurobiology, Physiology, and Behavior Major Program

(Section of Neurobiology, Physiology, and Behavior)

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, interact with their environment, maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated through the actions of the nervous and endocrine systems to 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 foundations for a challenging career in physiology and/or neurobiology and also serves as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in high school teaching, research, and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

**B.S. Major Requirements:**

|                                                                                                                                                                                     |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
|                                                                                                                                                                                     | UNITS          |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                             | <b>60-70</b>   |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                  | 15             |
| 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             |
| Statistics 13, 32, 100 (recommended), or 102 .....                                                                                                                                  | 3-4            |
| <b>Depth Subject Matter</b> .....                                                                                                                                                   | <b>50-51</b>   |
| Biological Sciences 101, 102, 103, 104 .....                                                                                                                                        | 13             |
| Neurobiology, Physiology and Behavior 100, 101, 101L, 102, 104L .....                                                                                                               | 19             |
| Select three or more units of laboratory course work from the following list .....                                                                                                  | 3              |
| Exercise Science 101L; Neurobiology, Physiology and Behavior 106, 111C, 111L, 160L, 194H; 199 courses or other courses with the approval of the master adviser.                     |                |
| Additional physiology depth unit requirement .....                                                                                                                                  | 12             |
| All other Neurobiology, Physiology and Behavior courses not used in satisfaction of any other requirement; Anthropology 154A, 154B; Entomology 104; Exercise Science 101, 102, 111. |                |
| One course from Anthropology 151, Evolution and Ecology 100, Geology 107 .....                                                                                                      | 3-4            |
| <b>Total Units for Major</b> .....                                                                                                                                                  | <b>110-121</b> |

**Master Adviser.** J. Goldberg (*Section of Neurobiology, Physiology, and Behavior*), 191 Briggs Hall.

**Advising Center.** 196 Briggs Hall (530-752-9696)

**Graduate Study.** The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study may be obtained by writing the Graduate Adviser, Graduate Group Complex. See also the graduate course offerings in Animal Behavior Graduate Group, Neuroscience Graduate Group, and Physiology Graduate Group. See also the Graduate Studies chapter of this catalog.

**The Plant Biology Major Program**

Plant biology is the study of plants as organisms. It includes the 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 Program.** The Plant Biology major consists of core courses in applied plant biology, plant anatomy, plant physiology, and plant ecology, as well as biochemistry, cell biology, and genetics. In addition, students complete a set of courses in one of the following areas: (1) general botany; (2) applied plant biology; (3) plant evolution and ecology; (4) plant genetics and breeding; and (5) plant physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization. Independent research opportunities in plant biology are available. Consult with an adviser.

**Career Alternatives.** A Plant Biology degree is an excellent credential for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. Plant biologists can work in the field, in the forest, in the laboratory, in botanical gardens or nurseries, in food or seed companies, or in pharmaceutical, energy or chemical industries, and pursue rewarding careers in the areas of biotechnology, environmental protection, or agribusiness. The program is also an excellent background for students wishing to enter graduate or other professional schools, including medicine, law or journalism.

**A.B. Major Requirements:**

|                                                                                           |              |
|-------------------------------------------------------------------------------------------|--------------|
|                                                                                           | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                   | <b>35</b>    |
| Biological Sciences 1A-1B-1C .....                                                        | 15           |
| Chemistry 2A-2B, 8A-8B .....                                                              | 16           |
| Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102 .....             | 4            |
| <b>Depth Subject Matter</b> .....                                                         | <b>41-42</b> |
| Biological Sciences 101 .....                                                             | 4            |
| Plant Biology 102 or 108 .....                                                            | 5            |
| Evolution and Ecology 140 or Plant Biology 116 .....                                      | 4            |
| Plant Biology 105, 111, 112, 117 .....                                                    | 15           |
| Additional upper division units in Plant Biology or related natural science courses ..... | 13-14        |
| <b>Total Units for the Major</b> .....                                                    | <b>76-77</b> |

**Recommended**

Chemistry 2C; Evolution and Ecology 100; Plant Biology 118, 119.

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 sections or departments, may be allowed on *prior* consultation with a Plant Biology major adviser.

**B.S. Major Requirements:**

|                                                                                                                                                                                                                                                                              |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                              | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                      | <b>60-61</b> |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                                                                                                           | 15           |
| Chemistry 2A-2B-2C .....                                                                                                                                                                                                                                                     | 15           |
| Chemistry 8A-8B .....                                                                                                                                                                                                                                                        | 6            |
| Mathematics 16A-16B-16C .....                                                                                                                                                                                                                                                | 9            |
| Physics 7A-7B-7C .....                                                                                                                                                                                                                                                       | 12           |
| Agricultural Systems and Environment 120 or Statistics 13, 32, 100, or 102 .....                                                                                                                                                                                             | 3-4          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                            | <b>45</b>    |
| Biological Sciences 101 or Plant Biology 152 (Students completing the Applied Plant Biology option or the Plant Genetics and Breeding option should take Plant Biology 152) .....                                                                                            | 4            |
| Biological Sciences 102, 103, 104 .....                                                                                                                                                                                                                                      | 9            |
| Plant Biology 105, 111 .....                                                                                                                                                                                                                                                 | 8            |
| Completion of one Option listed below .....                                                                                                                                                                                                                                  | 24           |
| Research experience through internships or special studies is recommended.                                                                                                                                                                                                   |              |
| <b>General Plant Biology option</b>                                                                                                                                                                                                                                          |              |
| Evolution and Ecology 100, Plant Biology 112 .....                                                                                                                                                                                                                           | 7            |
| Plant Biology 117 or 142 .....                                                                                                                                                                                                                                               | 4            |
| One course from the Applied Plant Biology course list (Plant Biology 175 recommended) .....                                                                                                                                                                                  | 3-5          |
| One course from the Evolution and Diversity course list .....                                                                                                                                                                                                                | 3-5          |
| Additional upper division course work from any of the four course lists, chosen in consultation with an adviser, to achieve a total of 24 or more units. At least one course chosen from the option course lists must include a formal laboratory or fieldwork section ..... | 3-7          |
| <b>Applied Plant Biology option</b>                                                                                                                                                                                                                                          |              |
| Plant Biology 112 .....                                                                                                                                                                                                                                                      | 3            |
| Plant Biology 142 or 143 .....                                                                                                                                                                                                                                               | 3-4          |
| Plant Biology 160, 175 .....                                                                                                                                                                                                                                                 | 8            |

Molecular and Cellular Biology 120L; Plant Biology 111L, 153, 158, 172L, 189, or Plant Pathology 120 .....

3-6

Additional upper division course work from the Applied Plant Biology course list to achieve a total of 24 or more units .....

3-7

**Plant Evolution and Ecology option**

Evolution and Ecology 100 .....

4

Plant Biology 117 or 142 .....

4

One course from the Applied Plant Biology course list (Plant Biology 175 recommended) .....

3-5

Additional upper division course work from the Ecology and/or Evolution and Diversity course list to achieve a total of 24 or more units. At least one course chosen must include a formal laboratory or fieldwork section .....

11-13

**Plant Genetics and Breeding option**

Plant Biology 108 or 143 .....

3-5

Plant Biology 154 .....

4

Plant Biology 112 or 113 or 160 .....

3

Plant Biology 161A or 161B .....

4

Addition course work from the Plant Genetics and Breeding course list to achieve a total of 24 or more units .....

8-10

**Plant Physiology, Development and Molecular Biology option**

Plant Biology 112 .....

3

Molecular and Cellular Biology 120L, 170L; Plant Biology 111L or 153 .....

3-6

One course from the Applied Plant Biology course list (Plant Biology 175 recommended) .....

3-5

One course from the Ecology course list (Plant Biology 117 recommended) .....

3-4

One course from the Evolution and Diversity course list .....

3-5

Additional upper division course work from the Plant Physiology, Development, and Molecular Biology course list to achieve a total of 24 or more units .....

1-9

**Total Units for the Major** .....

**105-106**

**Course Lists**

**Applied Plant Biology**

Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150, 170A, 170B, 195; Atmospheric Science 133; Entomology 100, 100L, 110, 119, 119L, 135; Environmental Horticulture 102, 105, 107, 120, 125, 130, 133; Environmental Toxicology 101; Hydrologic Science 124; International Agricultural Development 101; Nematology 100, 110; Plant Biology 121, 142, 143, 146, 151, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 173, 174, 175, 176, 177, 178, 188, 196; Plant Pathology 120, 125, Pomology 103; Range Science 100, 105, 133, 134; Soil Science 100, 105, 109, 111; Viticulture and Enology 101A, 101B, 101C, 110, 115, 116, 118.

**Ecology**

Agricultural Systems and Environment 112; Environmental Science and Policy 121, 123, 124, 128, 128L, 150C, 151, 151L, 155, 155L; Evolution and Ecology 121, 138; Hydrologic Science 122, 122L, 124; Plant Biology 117, 121, 142, 146; Range Science 133, 134.

**Evolution and Diversity**

Evolution and Ecology 100, 102, 140, 144, 149; Plant Biology 102, 108, 116, 118, 143, 148.

**Plant Genetics and Breeding**

Agricultural Systems and Environment 118, 150; Entomology 110; Evolution and Ecology 100, 144; Molecular and Cellular Biology 161, 164; Plant Biology 116, 117, 142, 151, 153, 157, 175; Plant Pathology 120, 125.

**Plant Physiology, Development, and Molecular Biology**

Molecular and Cellular Biology 126; Plant Biology 113, 125, 153, 157, 158, 160; Plant Pathology 130.

**Master Adviser.** A. Stemler, Plant Biology Section Office, 2220 Life Sciences Addition.

**Minor Program Requirements:**

UNITS

**Plant Biology** .....23

Biological Sciences 1C (or equivalent introductory plant biology course) .....5

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, 125, Plant Pathology 130.

*(c) Evolution and ecology:*

Evolution and Ecology 100, Plant Biology 102, 117, 143.

*(d) Applied plant biology:*

Agronomy 100, Plant Biology 154, 160, 171, 172, 175.

**Minor Adviser.** Same as for major above.

**Honors and Honors Programs.** Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

**Teaching Credential Subject Representative.** R.M. Thornton (*Section of Plant Biology*), 278 Robbins Hall. See also the Teacher Education Program.

**Graduate Study.** Consult the Plant Biology Graduate Group listing.

**Divisionwide Programs and Courses****Bodega Marine Laboratory 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 of marine invertebrates, 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).

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 Division of Biological Sciences. Applications are due before RSVP Pass 1 registration begins for spring quarter. Additional information on the Bodega Marine Laboratory Program is available from the Undergraduate Programs Office, 202 Life Sciences Addition, or directly from Bodega Marine Laboratory, 707-875-2211, P.O. Box 247, Bodega Bay, CA 94923.

**Courses in Biological Sciences (BIS)****Lower Division Courses**

**1A. Introductory Biology** (5) I, II, III. The Staff  
Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 2B (may be taken concurrently). Introduction to biological molecules, bioenergetics, cell structure and function, elements of molecular biology and genetics, and viruses. Interdisciplinary course for majors in the biological sciences.

**1B. Introductory Biology** (5) I. Keen; II.

The Staff; III. Keen, Stamps

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 1A. Topics covered include

transmission genetics, systematics, evolution, survey of the animal kingdom, comparative anatomy, physiology, and adaptation in animals.

**1C. Introductory Biology** (5) I. Thornton; II.

Stemler, Shackel/Labavitch; III. Thornton,

Sinha/Potter

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1A. Introduction to structure and function of plant tissues and organs; adaptive development and evolution of plants; survey of cyanobacteria, algae, fungi, and plants; principles of population and community ecology; and ecosystem analysis. GE credit: SciEng, Wrt.

**10. General Biology** (4) I. Goldberg; II. Marr; III.

Falk

Lecture—3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1A. GE credit: SciEng, Wrt.

**11A-11B. Issues in the Life Sciences** (2-2) I.

Holland, Villarejo; II. Goldberg

Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students' understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.

**15. Biology of Aging** (3) I. McDonald

Lecture—3 hours. Biological basis of the aging process. Topics include the normal aging process, developmental influence on the rate of aging, diseases of the aged, theories of aging, and mechanisms for modifying aging. Designed for students with limited biology backgrounds.

**\*19. Biology of Cancer** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 1A or 10, or Molecular and Cellular Biology 10 or Neurobiology, Physiology and Behavior 10. Interdisciplinary course offers an introduction to the biological, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in alternate years.

**92. Internship in Biological Sciences** (1-12) I, II, III. The Staff (Associate Dean in charge)

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff (Associate Dean in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Associate Dean in charge)

Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**101. Genes and Gene Expression** (4) I. Gottlieb (Evolution and Ecology), O'Neill (Plant Biology), Quiros (Vegetable Crops); II. Bowman (Plant Biology), Heyer (Microbiology), Rose; III. Dvorak (Agronomy and Range Science), Rodriguez and staff

Lecture—4 hours. Prerequisite: course 1B; 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.

**102. Structure and Function of Biomolecules**

(3) I. Hilt, Scholey, Sprechman; II. Gasser, Hilt, Hjelmland; III. Hilt, Sprechman, Theg (Plant Biology)

Lecture—3 hours. Prerequisite: Chemistry 8B or 118B or 128B. Structure and function of macromolecules with emphasis on proteins; enzyme kinetics; supramolecular assemblies; membranes; cytoskeleton; cell motility and cell division.

**103. Bioenergetics and Metabolism** (3) I. Doi, Mitchell; II. I.H. Segel, Callis; III. Carlson, L.D. Segel

Lecture—3 hours. Prerequisite: course 102. Fundamentals of metabolism including glycolysis and oxidative pathways; photosynthesis; biosynthesis of amino acids, nucleic acids and proteins.

**104. Regulation of Cell Function** (3) I. Crowe,

Nuccitelli; II. Erickson, Myles, Wilson

(Neurobiology, Physiology and Behavior);

III. Etzler, McNally

Lecture—3 hours. Prerequisite: course 101 and 102; course 103 recommended. Membrane receptors and signal transduction; cell trafficking; cell cycle, cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system.

**\*120. Developmental Biology of Marine**

**Invertebrates** (4) III. The Staff (Molecular and Cellular Biology)

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Molecular and Cellular Biology 150-150L, Biological Sciences 102 and 103; course 123 concurrently. Phylogenetic patterns of reproduction and development among the marine invertebrates. Emphasis on both modern and classical approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

**\*120P. Developmental Biology of Marine**

**Invertebrates/Advanced Laboratory Topics** (6)

III. The Staff (Molecular and Cellular Biology)

Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 120 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

**122. Population Biology and Ecology** (4) III.

Strong (Evolution and Ecology)

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: lower division core in biological sciences; course 123 concurrently. Population and community processes. Emphasis on biological and physical processes affecting plant and animal populations in the array of habitats at the ecological reserve. Modeling as a basis for designing experiments. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

**122P. Population Biology and Ecology/Advanced Laboratory Topics** (6) III.

Strong (Evolution and Ecology)

Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 122 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 122 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

**123. Undergraduate Colloquium in Marine**

**Science** (1) III. The Staff

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.)

**192. Internship in Biological Sciences** (1-12) I,

II, III. The Staff (Associate Dean in charge)

Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**194H. Research Honors** (2) I, II, III. The Staff

(Associate Dean in charge)

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.)

**197T. Tutoring in Biological Sciences** (1-3) I, II, III. The Staff (Associate Dean in charge)  
Prerequisite: upper division standing; appropriate background in biological sciences. Assisting in courses in Biological Sciences under the direction of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Associate Dean in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study in Biological Sciences** (1-5) I, II, III. The Staff (Associate Dean in charge)  
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**298. Group Study** (1-5) I, II, III. The Staff (Associate Dean in charge)  
Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

### Professional Course

**310. Effective Teaching of College Biology** (2) II. Thornton (Plant Biology)  
Informal lecture/discussion—2 hours. Teaching function of an academic career; objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (S/U grading only.)

## Sections of the Division of Biological Sciences

# Biological Sciences: Evolution and Ecology

Thomas W. Schoener, Ph.D., Chairperson of the Section

Section Office, 2320 Storer Hall (530-752-1272)

World Wide Web: <http://www-eve.ucdavis.edu>

### Faculty

#### Primary Section Members

Peter L. Chesson, Ph.D., Associate Professor  
James A. Doyle, Ph.D., Professor  
John H. Gillespie, Ph.D., Professor  
Leslie D. Gottlieb, Ph.D., Professor  
Richard K. Grosberg, Ph.D., Professor  
Charles H. Langley, Ph.D., Professor  
Sergey V. Nuzhdin, Ph.D., Assistant Professor  
Robert W. Pearcy, Ph.D., Professor  
Marcel Rejmanek, Ph.D., Professor  
Michael J. Sanderson, Ph.D., Associate Professor  
Thomas W. Schoener, Ph.D., Professor  
H. Bradley Shaffer, Ph.D., Professor  
Arthur M. Shapiro, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Judy A. Stamps, Ph.D., Professor  
Maureen L. Stanton, Ph.D., Professor  
Sharon Y. Strauss, Ph.D., Assistant Professor  
Donald R. Strong, Ph.D., Professor  
Catherine A. Toft, Ph.D., Professor  
Michael Turelli, Ph.D., Professor

#### Emeriti Faculty

Daniel I. Axelrod, Ph.D., Professor Emeritus  
Milton Hildebrand, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*

Everett W. Jameson, Ph.D., Professor Emeritus  
Jack Major, Ph.D., Professor Emeritus  
Peter R. Marler, Ph.D., Professor Emeritus  
Milton A. Miller, Ph.D., Professor Emeritus  
Timothy Prout, Ph.D., Professor Emeritus  
Robert L. Rudd, Ph.D., Professor Emeritus  
George W. Salt, Ph.D., Professor Emeritus  
G. Ledyard Stebbins, Ph.D., Professor Emeritus  
Kenneth E. F. Watt, Ph.D., LL.D., Professor Emeritus  
Grady L. Webster, Ph.D., Professor Emeritus

#### Affiliated Faculty

Susan L. Keen, Ph.D., Lecturer

## Courses in Evolution and Ecology (EVE)

### Lower Division Courses

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
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 Section of Evolution and Ecology. Internships supervised by a member of the faculty. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Upper Division Courses

**100. Introduction to Evolution** (4) I. Langley; II. Nuzhdin; III. Stanton  
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, 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.

**101. Introduction to Ecology** (4) I. Strauss; II. Toft; III. The Staff  
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C; Mathematics 16A, 16B, 16C or the equivalent. A general survey of the principles of ecology.

**102. Population and Quantitative Genetics** (4) II. Gillespie  
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.

**103. Phylogeny and Macroevolution** (3) II. Sanderson  
Lecture—3 hours. Prerequisite: course 100. Patterns and processes of evolution above the species level. Homology, homoplasy, and character evolution. Adaptive radiation; modes of rates of diversification. Evolution of complexity, and macroevolution of the genome. Principles of phylogeny reconstruction and their application to macroevolutionary studies.

**\*105. Phylogenetic Analysis of Vertebrate Structure** (4) I. The Staff  
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny.

**108. Systematics and Evolution of Angiosperms** (5) III. Doyle  
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. 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.

**\*112. Invertebrate Zoology** (4) II. The Staff  
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; course 112L (concurrently); courses in systematics, ecology, and evolution recommended. Sur-

vey of the invertebrate phyla emphasizing aquatic forms and focusing on morphology, development, natural history, and phylogenetic relationships.

**\*112L. Laboratory for Invertebrate Zoology** (3) II. The Staff  
Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B; course 112 concurrently. Field and laboratory experience with representative members of the invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates.

**117. Plant Ecology** (4) I. Pearcy  
Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; Plant Biology 112; Plant Biology 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Plant Biology 101. (Same course as Plant Biology 117.)

**121. Survey of Plant Communities of California** (4) III. Barbour  
Lecture—2 hours; fieldwork—1 hour; term paper. Prerequisite: Biological Sciences 1C recommended; consent of instructor required. Structure of selected plant communities and the relationship of their component species to the environment. Especially recommended for non-majors. GE credit: SciEng, Wrt.

**134. Herpetology** (3) III. Shaffer  
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; 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.

**134L. Herpetology Laboratory** (2) III. Shaffer  
Laboratory—6 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in alternate years.

**\*137. Ornithology** (2) II. The Staff  
Lecture—2 hours. Prerequisite: course 101 or the equivalent course in ecology. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildlife, Fish and Conservation Biology 111 may not receive credit for this course.

**\*137L. Ornithology Laboratory** (3) II. The Staff  
Laboratory—6 hours. Prerequisite: course 101 or 137 (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics, and reproduction of California birds.

**138. Ecology of Tropical Latitudes** (3) III. Shapiro  
Lecture—3 hours. Prerequisite: any one of the following: Biological Sciences 1A, 1B, or 10, Plant Biology 10, Geography 2 or 2G, or Wildlife, Fish and Conservation Biology 10. 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.

**140. Paleobotany** (4) I. Doyle  
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. 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.

**141. Principles of Systematics** (3) II. Shapiro  
Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. Offered in alternate years.



**\*147. Biogeography** (4) I. Shapiro

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. Offered in alternate years.

**149. Evolution of Ecological Systems** (4) I.

Shapiro

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.

**\*170. Comparative Biomechanics** (3) I. The Staff

Lecture—3 hours. Prerequisite: Physics 7A, 7B, Mathematics 16A, 16B, 16C, Biological Sciences 1B. Biomechanics and functional morphology of vertebrates and invertebrates. Emphasis on physical laws that provide design principles for a wide range of organisms. Principles from fluid and solid mechanics, acoustics and vibration. Locomotion, skeletal morphology, biological materials, and waves. Offered in alternate years.

**\*170L. Comparative Biomechanics Laboratory**

(3) I. The Staff

Laboratory—6 hours; term paper. Prerequisite: Physics 7A, 7B, Mathematics 16A, 16B, 16C, Biological Sciences 1B; course 170 recommended to be taken concurrently. Experimental techniques for measuring physical quantities relevant to organismal designs. Demonstration of principles in fluid, solid, and acoustical mechanics. Emphasis on use of electronic transducers and computerized data collection. Includes a student-designed research project. Offered in alternate years.

**189. Introduction to Biological Research** (1) I,

II, III. The Staff (Chairperson in charge)

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.)

**190. Undergraduate Seminar** (2) I. Shapiro; II,

III. The Staff

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.)

**192. Internship** (1-12) I, II, III. The Staff

(Chairperson in charge)

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 Section of Evolution and Ecology. Internships supervised by a member of the faculty. (P/NP grading only.)

**194HA-194HB-194HC. Research Honors** (2-2-2)

I, II, III. The Staff

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** (1-5) I, II, III. The Staff

Tutorial—1-5 hours. Prerequisite: upper division standing. Experience in teaching under guidance of the staff. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced****Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****221. Behavioral Ecology** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 102 or the equivalent, and graduate standing. Introduction to the main issues treated in modern behavioral ecology, the main experimental techniques used to treat these issues and the major theoretical methods used to develop predictive models. Offered in alternate years.

**240. Paleobotany and Angiosperm Evolution**

(4) II. Doyle

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 angiosperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in alternate years.

**\*243. Palynology** (4) I. Doyle

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 108, 116, or course 140. Morphology of spores and pollen grains and their use in stratigraphy, plant systematics and evolution, and paleoecology. Techniques for study of modern spores and pollen and extraction and identification of fossil palynomorphs from sediments of Paleozoic to Quaternary age. Offered in alternate years.

**287. Seminar in Animal Behavior** (2) I. Stamps

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

**290. Current Topics** (1) I, II, III. The Staff

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.)

**290C. Research Conference** (1) I, II, III. The Staff

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.)

**\*294. Seminar in Animal Ecology** (3) III.

The Staff

Seminar—3 hours. Prerequisite: course 101 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

**298. Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

**Professional Course****390. Methods of Teaching** (2) I, II, III. The Staff

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.)

## Biological Sciences: Microbiology

Stephen C. Kowalczykowski, Ph.D., Chairperson of the Section

Section Office, 156 Hutchison Hall (530-752-0262)

World Wide Web: <http://www-mic.ucdavis.edu/micro>

**Faculty****Primary Section Members**

Stanley W. Artz, Ph.D., Professor

Paul Baumann, Ph.D., Professor

Wolf-Dietrich Heyer, Ph.D., Associate Professor

Michele M. Igo, Ph.D., Associate Professor

Daniel J. Klionsky, Ph.D., Professor

Stephen C. Kowalczykowski, Ph.D., Professor

JaRue S. Manning, Ph.D., Professor

John C. Meeks, Ph.D., Professor

Douglas C. Nelson, Ph.D., Professor

Martin L. Privalsky, Ph.D., Professor

Kazuhiro Shiozaki, Ph.D., Assistant Professor

Mitchell H. Singer, Ph.D., Assistant Professor

Valley J. Stewart, Ph.D., Professor

Merna R. Villarejo, Ph.D., Professor

Mark L. Wheelis, Ph.D., Senior Lecturer

**Secondary Section Members**

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Irwin H. Segel, Ph.D., Professor

**Emeriti Faculty**

Robert E. Hungate, Ph.D., Professor Emeritus

John L. Ingraham, Ph.D., Professor Emeritus

Allen G. Marr, Ph.D., Professor Emeritus

Herman J. Phaff, Ph.D., Professor Emeritus

David Pratt, Ph.D., Professor Emeritus

## Courses in Microbiology (MIC)

**Lower Division Courses****10. Natural History of Infectious Diseases** (4) II.

Manning

Lecture—3 hours; discussion—1 hour. 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. Designed for students not majoring in the biological sciences. GE credit: SciEng, Wrt.

**\*20. Biology of Microorganisms** (4) II. The Staff

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 10. Survey of the diversity of microorganisms (viruses, bacteria, protists), their metabolism, genetics, and habitats. Emphasis on importance to humans—role of microorganisms in global element cycles, in food production, and in disease. GE credit: SciEng, Wrt.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**Upper Division Courses****102. General Bacteriology** (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: Biological Sciences 1A and Chemistry 8B or Chemistry 118 (may be taken concurrently). Survey of the biology of bacteria and viruses, including bacterial structure, metabolism, physiology, genetics, and evolution; viral structure and replication; the role of bacteria in global element cycles; and the role of microbes in infectious disease.

**102L. General Bacteriology Laboratory** (2) I, II,

III. The Staff

Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently) and consent of instructor. Introduction to principles and laboratory methods employed in working with microorganisms. For students planning to continue study of microbiology, or use microorganisms as tools for study of genetics and biochemistry.

**105. Bacterial Diversity** (5) II. Nelson

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 102, 102L, Biological Sciences 102 and consent of instructor; Biological Sciences 103 recommended. Survey of the major groups of bacteria emphasizing diversity of energy metabolism, morphology and natural history. Includes methods for determination of evolutionary relationships among groups. Isolation and characterization of bacterial strains from various habitats.

**\*110. Bacteriology of Insects** (3) II. Baumann

Lecture—3 hours. Prerequisite: course 102; Biological Sciences 102. Physiological basis of pathogenic and symbiotic associations between prokaryotic and eukaryotic organisms. Taxonomy, physiology, pathogenesis, and molecular biology of insect pathogens. Insect immunity. Nutritional associations between microorganisms



and insects. Pertinent entomological background information will be included.

**120. Microbial Ecology** (3) III. Meeks

Lecture—3 hours. Prerequisite: course 105, Biological Sciences 102. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

**120L. Microbial Ecology Laboratory** (2) III.

Meeks

Laboratory—6 hours; one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done on student selected specific habitats of microorganisms. Limited enrollment.

**140. Bacterial Physiology** (3) I. Singer

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 (may be taken concurrently); course 102 recommended (may be taken concurrently). 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.

**150. Bacterial Genetics** (3) II. Igo

Lecture—3 hours. Prerequisite: Biological Sciences 101 and 102; course 102 (may be taken concurrently) recommended. Fundamentals of bacterial and phage genetics. Topics will include generating mutations, phage genetics, classical bacterial genetics, molecular techniques to generate mutations and physical mapping techniques. Not open for credit to students who have completed course 130A.

**155L. Bacteriology Physiology Laboratory**

(3) III. Artz

Laboratory—9 hours. Prerequisite: course 140 or 150; course 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. Former course 130L. Not open for credit to students who have taken course 130L.

**\*160. Bacterial Regulatory Mechanisms**

(3) III. Kowalczykowski, Artz

Lecture—3 hours. Prerequisite: course 140 or 150 recommended. Fundamentals of bacterial regulatory mechanisms. Topics will include control of DNA, RNA, and protein synthesis, global regulatory mechanisms, recombination, DNA repair systems, and cell cycle control with emphasis on bacterial systems. Not open for credit to students who have taken course 130B. (Former course 130B.)

**162. General Virology** (4) II. Manning, Falk (Plant Pathology)

Lecture—4 hours. Prerequisite: Biological Sciences 1A, 102. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics.

**\*177. Metabolism of Anaerobic Bacteria** (3) II.

The Staff

Lecture—3 hours. Prerequisite: course 102; Biological Sciences 103 (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

**\*177L. Laboratory in Metabolism of Anaerobic Bacteria** (2) II. The Staff

Laboratory—6 hours. Prerequisite: course 102L; course 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in alternate years.

**190C. Undergraduate Research Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**192. Internship** (1-12) I, II, III. The Staff

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) I, II, III. The Staff

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.)

**197T. Tutoring in Microbiology** (1-5) I, II, III.

The Staff (Chairperson in charge)

Tutoring—1-5 hours. Prerequisite: course 102L and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty; in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**200A-\*200B-\*200C. Microbiology for First-Year Graduate Students** (3-3-3) I-II-III. The Staff

(Graduate Group chairperson in charge)

Lecture—3 hours. Prerequisite: first-year graduate standing with interest in microbiology. A survey of general microbiology at the graduate level.

**201L. Advanced Microbiology Laboratory Rotations** (5) I, II. The Staff

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 twice for credit.

**210. Molecular Mechanisms in Microbial Pathogenesis** (3) III. Manning, Hirsh (Pathology, Microbiology and Immunology)

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.

**215. Recombinant DNA** (3) I. Privalsky

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.

**\*215L. Recombinant DNA Laboratory** (4) I.

Privalsky

Laboratory/discussion—10 hours. Prerequisite: course 130L or Molecular and Cellular Biology 120L; Biological Sciences 101; consent of instructor. Application of the 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. (Submit application, available from Microbiology Section Office, two weeks prior to first day of class.)

**\*240. Biology of Autotrophic Prokaryotes** (3) I. Meeks, Wheelis

Lecture/discussion—3 hours. Prerequisite: Biological Sciences 103. Biochemistry and ecology of photo- and chemoautotrophic bacteria, and of methylotrophic bacteria, with special emphasis on the mechanisms of ATP and reductant generation. Offered in alternate years.

**\*250. Biology of Yeasts** (5) II. Bisson (Viticulture and Enology)

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. Offered in alternate years.

**\*260. Bacterial Genetic Regulatory Mechanisms** (3) I. Artz

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. Offered in alternate years.

**262. Advanced General and Molecular Virology** (3) III. Manning, Luciw (Medical Pathology), Bruening (Plant Pathology)

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.

**\*263. Principles of Protein-Nucleic Acid Interactions** (3) III. Kowalczykowski

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. Offered in alternate years.

**\*270. Advanced Animal Virology** (3) III.

Manning, Luciw (Medical Pathology)

Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses. May be repeated for credit. Offered in alternate years.

**274. Seminar in Genetic Recombination** (1) I, II, III. Kowalczykowski

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. (S/U grading only.)

**290C. Advanced Research Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**291. Selected Topics in Microbiology** (1) I, II, III. Singer

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.)

**292. Seminar in Bacterial Physiology, Genetics and Virology** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics, and viro-

ogy with presentations by individual students. (S/U grading only.)

**\*293. Seminar in Protein Sorting** (1) I, II. Klionsky Seminar—1 hour. Prerequisite: consent of instructor. Current research papers on the topics of organelle biogenesis, protein sorting and secretion. May be repeated for credit. (S/U grading only.)

**296. Seminar in Animal Virology** (1) II. Manning Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (Same course as Pathology, Microbiology and Immunology 292A.) May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

### Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Biological Sciences: Molecular and Cellular Biology

Michael E. Dahmus, Ph.D., Chairperson of the Section  
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### Faculty

#### Primary Section Members

Peter B. Armstrong, Ph.D., Professor  
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Ronald J. Baskin, Ph.D., Professor  
Kenneth C. Burtis, Ph.D., Associate Professor  
Judy Callis, Ph.D., Associate Professor  
Don M. Carlson, Ph.D., Professor  
James S. Clegg, Ph.D., Professor  
Richard S. Criddle, Ph.D., Professor  
John H. Crowe, Ph.D., Professor  
Michael E. Dahmus, Ph.D., Professor  
Roy H. Doi, Ph.D., Professor  
Carol A. Erickson, Ph.D., Professor  
Marilynn E. Etzler, Ph.D., Professor  
Charles S. Gasser, Ph.D., Professor  
Robert D. Grey, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
R. Scott Hawley, Ph.D., Professor  
Jerry L. Hedrick, Ph.D., Professor  
Leonard M. Hjelmeland, Ph.D., Professor (*Ophthalmology*)  
John A. Kiger, Ph.D., Professor  
J. Clark Lagarias, Ph.D., Professor  
Francis J. McNally, Ph.D., Assistant Professor  
Mark G. McNamee, Ph.D., Professor  
Diana G. Myles, Ph.D., Professor  
Jeanette E. Natzle, Ph.D., Associate Professor  
Richard L. Nuccitelli, Ph.D., Professor  
Jodi Nunnari, Ph.D., Assistant Professor  
Raymond L. Rodriguez, Ph.D., Professor  
Leslie S. Rose, Ph.D., Assistant Professor  
Carl W. Schmid, Ph.D., Professor (*Chemistry*)  
Jonathan M. Scholey, Ph.D., Professor  
Irwin H. Segel, Ph.D., Professor  
Che-Kun J. Shen, Ph.D., Professor  
Larry R. Sprechman, Ph.D., Lecturer  
David K. Wilson, Ph.D., Assistant Professor

#### Secondary Section Members

Ernest S. Chang, Ph.D., Professor (*Animal Science*)  
Richard H. Falk, Ph.D., Professor  
Andrew Fisher, Ph.D., Assistant Professor (*Chemistry*)  
Leslie D. Gottlieb, Ph.D., Professor

John J. Harada, Ph.D., Professor  
Daniel J. Klionsky, Ph.D., Associate Professor  
Stephen C. Kowalczykowski, Ph.D., Professor  
William J. Lucas, Ph.D., Professor  
Brian Mulloney, Ph.D., Professor  
Sharman O'Neill, Ph.D., Associate Professor  
Pamela A. Pappone, Ph.D., Professor  
Martin L. Privalsky, Ph.D., Professor  
Steven M. Theg, Ph.D., Associate Professor  
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*  
Larry N. Vanderhoef, Ph.D., Professor  
Merna R. Villarejo, Ph.D., Professor  
Martin Wilson, Ph.D., Professor

### Emeriti Faculty

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Sterling Chaykin, Ph.D., Professor Emeritus  
Eric E. Conn, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*, *UC Davis Prize for Teaching and Scholarly Achievement*  
David W. Deamer, Ph.D., Professor Emeritus  
Gordon J. Edlin, Ph.D., Professor Emeritus  
Melvin M. Green, Ph.D., Professor Emeritus  
Lloyd L. Ingraham, Ph.D., Professor Emeritus  
Paul K. Stumpf, Ph.D., Professor Emeritus

### Affiliated Faculty

Ruth E. Ballard, Ph.D., Lecturer  
Benjamin F. Edwards, Ph.D., Lecturer  
Robert Fairclough, Ph.D., Associate Professor (*Neurology*)  
Kenneth L. Hilt, Ph.D., Lecturer  
Donna M. Lagarias, Ph.D., Lecturer  
Leann L. Lindsay, Ph.D., Lecturer  
Ryan D. Mitchell, Ph.D., Lecturer  
Mark F. Sanders, Ph.D., Lecturer  
Leigh D. Segel, Ph.D., Lecturer  
Jimmy L. Spearow, Ph.D., Lecturer

## Courses in Molecular and Cellular Biology (MCB)

### Lower Division Courses

**10. Introduction to Human Heredity** (4) I. Hawley; III. Sanders  
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, Wrt.  
**99. Special Study** (1-5) I, II, III. The Staff  
Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**120L. Biochemistry Laboratory** (6) I. Fairclough (Neurology), Hedrick, Hilt, Lindsay, Sprechman; II. Doi, Hilt, J. Lagarias, L. Segel, Sprechman; III. Criddle, Hilt, Lindsay, McNamee, Nunnari, Shen, Sprechman  
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.

**121. Molecular Biology of Eukaryotic Cells** (3) II. Dahmus; III. Gasser, Hjelmeland  
Lecture—3 hours. Prerequisite: Biological Sciences 101, 103, course 120L. 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 course 141 or 161.

**122. Structure and Function of Proteins** (3) I. Criddle; II. Baldwin, Sprechman  
Lecture—3 hours. Prerequisite: course 120L, Biological Sciences 103. Correlation of structure and biolog-

ical function. Molecular models of enzymes that explain their physiological functioning. Physical and chemical methods used in determining protein structure. Function as measured by kinetic and binding models and as affected by physiological considerations.

**123. Behavior and Analysis of Enzyme and Receptor Systems** (3) III. I.H. Segel, Wilson  
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, multireactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses.

**126. Plant Biochemistry** (3) III. Abel (Vegetable Crops), Callis  
Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent, and Biological Sciences 103. 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.)

**138. Undergraduate Seminar in Biochemistry** (1) I. Carlson; II. Callis, Wilson; III. Etzler  
Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated twice for credit when topic differs. (P/NP grading only.)

**140L. Cell Biology Laboratory** (4) II. Baskin, Myles  
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 104 (may be taken concurrently). Exercises illustrating the principles of cell biology with emphasis on light microscopy.

**\*141. Cellular Regulation of Gene Expression** (4) III. Natzle  
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101 and 102; Biological Sciences 104 recommended. Molecular and cellular mechanisms for regulating the flow of information from genome to the cytoplasm, and from one generation to the next in eukaryotes and prokaryotes. Various levels of regulation will be discussed from an experiment-based perspective. Not open for credit to students who have completed course 121 or 161.

**142. Advanced Cell Biology: Contractile and Motile Systems** (4) III. Baskin  
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 104; Mathematics 16B. Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems.

**\*146. Histology** (4) II. The Staff  
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Sciences 104. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes.

**\*148. Undergraduate Seminar in Cell Biology** (2) I, II, III. The Staff  
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. Embryology** (4) I. Armstrong; III. Erickson  
Lecture—4 hours. Prerequisite: Biological Sciences 1A-1B, and concurrent enrollment in course 150L. The events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

**150L. Laboratory in Vertebrate Embryology** (1) I. Armstrong, Edwards; III. Edwards, Erickson  
Laboratory—3 hours. Prerequisite: concurrent enrollment in course 150. The comparative analysis of the embryonic development of vertebrates. (P/NP grading only.)

**\*151L. Advanced Developmental Biology** (4) II. Erickson, Natzie, Jeffery, Nuccitelli  
Lecture—2 hours; laboratory—6 hours; written report required. Prerequisite: courses 150, 150L; Biological Sciences 103. Modern topics in developmental biology followed by sophisticated laboratory exercises that demonstrate lecture topics. Students conduct independent studies during last four weeks of quarter.

**158. Undergraduate Seminar in Developmental Biology** (2) I. Myles

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.)

**\*159. Senior Colloquium in Developmental Biology** (3) II. Grey

Lecture—1 hour; seminar—2 hours. Prerequisite: course 150 with a grade of B or better; consent of instructor. Analysis of major topics in developmental biology, including fertilization and activation of development, morphogenesis, cell differentiation, and pattern formation. Limited enrollment.

**160L. Principles of Genetics Laboratory** (4) I, II. Sanders and staff; III. Kiger and staff  
Laboratory—6 hours; lecture—2 hours. Prerequisite: Biological Sciences 101. Laboratory work in basic and molecular genetics including gene mapping and isolation of mutants.

**161. Molecular Genetics** (3) I. Britt (Plant Biology), Shen

Lecture—3 hours. Prerequisite: Biological Sciences 101; Biological Sciences 103 (may be taken concurrently). Molecular genetics including DNA structure and replication, restriction analysis, sequencing, transcription, translation and gene regulation. Not open for credit to students who have completed course 121 or 141.

**162. Human Genetics** (3) II. Hawley

Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects. GE credit: SciEng, Wrt.

**163. Developmental Genetics** (3) II. Burtis

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102; course 150 recommended. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals.

**164. Advanced Eukaryotic Genetics** (3) III. Burtis, Hawley

Lecture—3 hours. Prerequisite: Biological Sciences 101. Concentration on the five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Special emphasis will be placed on the theory and practice both of isolating new mutations and of analyzing existing mutations.

**\*166. Advanced Developmental Genetics** (3) III. Kiger

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 161, 163. Topics of current interest in the area of genetic control of development. Focus on the genetic dissection of development in *Drosophila* and *Caenorhabditis*, with emphasis on transgenic and other novel techniques for the description and manipulation of developmental processes. (P/NP grading only.)

**\*170L. Advanced Molecular Genetics Laboratory** (6) II, III. The Staff

Laboratory—9 hours; lecture—1 hour; discussion—2 hours. Prerequisite: Biological Sciences 101; courses 120L or 160L; course 121, 141, or 161; and consent of instructor. Molecular analysis of gene structure and function. Isolation, manipulation, and characterization of DNA, RNA, and proteins using recombinant DNA technology. Limited enrollment.

**178. Undergraduate Seminar in Molecular Genetics** (1) I. Sanders; II. Hawley, Rodriguez, Sanders; III. Hawley, Rose

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.)

**190C. Undergraduate Research Conference** (1) I, II, III. The Staff

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.)

**191. Introduction to Research** (1) I, II. L. Segel  
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.)

**192. Internship** (1-12) I, II, III. The Staff  
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) I, II, III. The Staff  
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.)

**194H. Research Honors** (3) I, II, III. The Staff  
Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing; GPA of at least 3.25; 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** (1-5) I, II, III. The Staff  
Tutoring—1-5 hours. Prerequisite: upper division standing, completion of course to be tutored, and consent of instructor. To assist the instructor by tutoring students in one of the Section's regular courses. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff  
Variable—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

## Graduate Courses

**200A. Current Techniques in Cell Biology** (2) I. Nuccitelli

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) II. Hedrick

Lecture—2 hours. Prerequisite: Biological Sciences 103 and course 120L or the equivalent courses. Current techniques used in biochemical research

including protein and carbohydrate analyses, immunochemistry, recombinant DNA methods, electrophoretic and chromatographic methods.

**200C. Current Techniques in Biophysics** (2) III. Fairclough (Neurology)

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.)

**220L. Advanced Biochemistry Laboratory Rotations** (5) I, II, III. McNally, Nunnari

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 twice for credit.

**221A. Physical Biochemistry** (4) I. Baldwin, Schmid, Wilson

Lecture—4 hours. Prerequisite: Biological Sciences 103; Chemistry 107B-108 and 128C, 129C or 118C or the equivalents. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules.

**\*221B. Integration of Metabolism and Regulatory Phenomena** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 221A or consent of instructor. Regulatory phenomena that occur in control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways including homeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems.

**221C. Molecular Biology** (4) III. Baldwin, Dahmus, Hershey (Biological Chemistry)

Lecture—4 hours. Prerequisite: course 221A. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells, and viruses.

**221D. Cellular Biochemistry** (4) II. Etzler, Hanley (Biological Chemistry), Scholey

Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A. Molecular structure and biochemical function of cell membranes, cytoplasmic organization, organelle trafficking, signaling, mechanisms of intracellular transport, chromosome segregation and cell division with emphasis on biochemical principles.

**\*231. Membrane Biochemistry** (2) III. McNamee

Lecture—2 hours. Prerequisite: course 221D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in alternate years.

**\*232. Chemical Modifications of Proteins** (3) III. Benisek (Biological Chemistry)

Lecture—3 hours. Prerequisite: Biological Sciences 103; Chemistry 128C or 118C or the equivalent courses. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in alternate years.

**241. Membrane Biology** (3) II. Crowe

Lecture—3 hours. Prerequisite: Biological Sciences 102 and 103, or Biological Sciences 104 and course 141, or consent of instructor. This course will emphasize biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membranous components of cells. Offered in alternate years.

**\*242. Muscle Biophysics** (4) I. Baskin

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biological Sciences 102, 103 and Mathematics 16B or 21B; or consent of instructor. The physical and chemical aspects of muscle function.



**248. Seminar in Cell Biology** (2) III. Scholey  
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.

**\*249. Literature in Cell Biology** (1) I, II, III.

The Staff

Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of recent journal articles in cell biology. General topic area will change each quarter. May be repeated for credit. (S/U grading only.)

**\*250. Special Topics in Cell Biology** (3) I.

Deamer

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in cell biology. May be repeated for credit.

**\*251. Biology of Fertilization** (3) I. Hedrick, Myles, Nuccitelli

Lecture—2 hours; term paper. Prerequisite: Biological Sciences 104 or the equivalent, and consent of instructor. The morphology, physiology, and biochemistry of gametes, and the mechanism and consequences of their union. Offered in alternate years.

**\*252. Cellular Basis of Morphogenesis** (4) III.

Armstrong

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.

**\*253. Pattern Formation** (4) II. Nuccitelli

Lecture—3 hours; term paper. Prerequisite: course 150, Biological Sciences 104 or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with ooplasmic segregation. Emphasis will be on cell polarity, but some multicellular systems will also be covered. Offered in alternate years.

**\*254. Mechanisms of Organogenesis** (4) II.

The Staff

Lecture—3 hours; term paper. Prerequisite: course 150. This course will demonstrate the various means by which several cell types become organized and differentiate to form a functional unit, using five selected organ systems. Offered in alternate years.

**\*255. Molecular Mechanisms in Animal Development** (3) I. Natzle

Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and molecular genetics recommended. Analysis of the molecular mechanisms that control animal development, with a special focus on multiple levels of gene regulation. Experimental systems including *Drosophila*, amphibians, *C. elegans*, and mice will be discussed. Readings will be taken from current literature. Offered in alternate years.

**256. Cell and Molecular Biology of Cancer** (2) I. Armstrong

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.

**258. Seminar in Development** (2) II. Armstrong, Erickson

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit.

**259. Literature in Developmental Biology** (1) I, II, III. Armstrong, Erickson

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.)

**262. Recombinant DNA and Genetic Engineering** (3) II. Rodriguez

Lecture—3 hours. Prerequisite: course 161 or Microbiology 130A-130B or consent of instructor. This course will explore the biology of necessary elements such as plasmids, transposons insertion sequences, prophages, etc. Both prokaryotic and eukaryotic moveable genetic elements will be discussed. The molecular biology of plasmid replication, illegitimate recombination, etc., will be considered. Offered in alternate years. (S/U grading only.)

**263. Biotechnology Fundamentals and Application** (2) II. Doi, Ryu, Privalsky

Lecture—2 hours. Prerequisite: Biological Sciences 101, 102, Microbiology 102, graduate student in good standing. To train graduate students interested in a biotechnology career track; to learn recombinant DNA, rate processes of biological systems, optimization of bioreactor performance, practical issues in biotechnology, and some case studies of the development of biotechnology products and processes. Offered in alternate years.

**282. Biotechnology Internship** (1-12) I, II, III.

Doi, Ryu

Internship/laboratory—3-36 hours. Prerequisite: graduate student in good academic standing or consent of instructor. Research at a biotechnology company for a minimum of three months as part of the Designated Emphasis in Biotechnology.

**290C. Research Conference** (1) I, II, III. The Staff  
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.)

**291. Current Progress in Molecular and Cellular Biology** (1) I, II, III. The Staff

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.)

**294. Current Progress in Biotechnology** (1) I, II, III. Doi, Ryu

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.)

**295. Literature in Molecular and Cellular Biology** (1) I. Privalsky (Microbiology); II. Radke

(Avian Sciences); III. Oberbauer (Animal Science)  
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.)

**\*296. Research Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. Prerequisite: course 221C or consent of instructor. Presentation and critical discussions of research activities of various members of the local molecular and cellular biology community; primarily designed for graduate students. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff  
Variable—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff  
Independent study—3-36 hours. (S/U grading only.)

### Professional Course

**390. Methods of Teaching** (1) I, II, III. The Staff  
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.)

## Biological Sciences: Neurobiology, Physiology, and Behavior

Leo M. Chalupa, Ph.D., Chairperson of the Section  
Section Office, 196 Briggs Hall (530-752-0203)  
World Wide Web: <http://www.npb.ucdavis.edu>

### Faculty

#### Primary Section Members

Thomas P. Adamson, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*  
Marylenn S. Barkley, Ph.D., Associate Professor  
Kenneth H. Britten, Ph.D., Assistant Professor  
Earl E. Carstens, Ph.D., Professor  
Leo M. Chalupa, Ph.D., Professor  
Ernest S. Chang, Ph.D., Professor (*Animal Science*)  
Barbara Chapman, Ph.D., Assistant Professor  
Nicola S. Clayton, Ph.D., Assistant Professor  
Charles A. Fuller, Ph.D., Professor  
John D. Furlow, Ph.D., Assistant Professor  
Jack M. Goldberg, Ph.D., Lecturer  
Charles M. Gray, Ph.D., Assistant Professor  
Barbara A. Horwitz, Ph.D., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*

Andrew T. Ishida, Ph.D., Associate Professor  
Joel E. Keizer, Ph.D., Professor  
Gary P. Moberg, Ph.D., Professor (*Animal Science*)  
Brian Mulloney, Ph.D., Professor  
Gabrielle A. Nevitt, Ph.D., Assistant Professor  
Pamela A. Pappone, Ph.D., Professor  
Gregg H. Recanzano, Ph.D., Assistant Professor  
Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor  
Arnold J. Sillman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Mitchell L. Sutter, Ph.D., Assistant Professor  
W. Jeff Weidner, Ph.D., Professor  
Martin Wilson, Ph.D., Professor  
Charles M. Winget, Ph.D., Lecturer  
Dorothy E. Woolley, Ph.D., Professor

#### Secondary Section Members

Ronald J. Baskin, Ph.D., Professor  
John H. Crowe, Ph.D., Professor  
Mark G. McNamee, Ph.D., Professor  
Judy A. Stamps, Ph.D., Professor

#### Emeriti Faculty

James M. Boda, Ph.D., Professor Emeritus  
Harry W. Colvin, Ph.D., Professor Emeritus  
John M. Horowitz, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
Frederick W. Lorenz, Ph.D., Professor Emeritus  
Peter R. Marler, Ph.D., Professor Emeritus  
Verne E. Mendel, Ph.D., Professor Emeritus  
Arthur H. Smith, Ph.D., Professor Emeritus

## Courses in Neurobiology, Physiology, and Behavior (NPB)

### Lower Division Courses

**10. Elementary Human Physiology** (4) III.

The Staff

Lecture—3 hours; discussion—1 hour. 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.



**12. Human Nervous System** (3) III. Recanzone  
Lecture—3 hours. Organization and function of the human nervous system for non-science majors. Brain function discussed in relation to cognition, learning and memory, and neurological diseases. Not open for credit to students who have completed courses 100, 112 or Psychology 108. GE credit: SciEng.

**12G. Understanding the Human Nervous System** (1) III. Recanzone

Discussion—1 hour. Prerequisite: concurrent enrollment in course 12. For non-science majors. Scientific studies of brain function will be discussed in relation to ethical considerations, social, economic, and political implications and current and future research. GE credit with concurrent enrollment in course 12: Wrt.

**Upper Division Courses**

**100. Neurobiology** (4) I. Chapman, Sutter; III. Mulloney

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B; Physics 5C or 7C recommended. Brains and nervous systems, neurons and neural circuits. Vision, hearing, and feature extraction by the central nervous system. Development of nervous systems. Coordination of movement. The cell biology of learning and memory. Perception, cognition, and disorders of the brain. Not open for credit to students who have completed course 112, 160, 161 or 162, or Neuroscience 221 or 222.

**101. Systemic Physiology** (5) I, II, III. Adamson, Barkley, Fuller, Furlow, Ishida, Goldberg, Sillman, Weidner

Lecture—5 hours. Prerequisite: Biological Sciences 1B; 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.

**101L. Systemic Physiology Laboratory** (3) I. Adamson; III. Goldberg

Laboratory—3 hours; discussion—2 hours. Prerequisite: course 101 prior to taking 101L recommended, but 101 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 101.

**102. Animal Behavior** (3) II. Clayton; III. Nevitt  
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. 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.)

**103. Cellular Physiology/Neurobiology** (3) II. Pappone

Lecture—3 hours. Prerequisite: Biological Sciences 103 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) II. Horwitz

Lecture—1 hour; laboratory—five 6-hour sessions and discussion—five 2-hour sessions to alternate weekly; extensive writing. Prerequisite: course 100 or 101 and Biological Sciences 103 and 104. Experiments in the physical and chemical processes of cells and tissues. GE credit: Wrt.

**105. Introduction to Computer Models** (4) III. Keizer

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. Applica-

tions include membrane transport, ionic channels, action potentials,  $Ca^{2+}$  oscillations, respiration, and muscle contraction. Offered in alternate years.

**106. Experiments in Neurobiology, Physiology, and Behavior: Design and Execution** (3) I, II, III. The Staff

Laboratory—7.5 hours; discussion—0.5 hours. Prerequisite: Course 100, 101, or 102 and consent of instructor. Experiments in current physiological, neurobiological, or animal behavior problems. Discussion of experimental design. Students choose a project and, independently or in groups of 2-3, design a protocol, do the project and report their findings. May be repeated once for credit with consent of instructor. (P/NP grading only.)

**111C. Advanced Systemic Physiology Laboratory** (3) II. Sutter

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** (3) I, III. Adamson

Lecture—1 hour; laboratory—6 hours; discussion—2 hours (laboratory and discussion alternate weekly). Prerequisite: courses 101, 101L. Selected comprehensive experiments in the autonomic nervous system, the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems. Not open for credit to students who have completed courses 111A or 111B. (Former courses 111A, 111B.) GE credit: Wrt.

**112. Neuroscience** (3) I. Carstens; III. Gray

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.

**113. Cardiovascular, Respiratory, and Renal Physiology** (4) II. Goldberg

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) III. Horwitz

Lecture—3 hours; term paper. Prerequisite: course 101; Biological Sciences 103 recommended. Advanced gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastrointestinal tract; some pathology and nutritional items will be covered. GE credit: Wrt.

**117. Avian Physiology** (3) III. Millam

Lecture—3 hours. Prerequisite: course 101 or Biological Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems.

**\*119. Invertebrate Physiology** (4) II. Crowe

Lecture—3 hours; term paper; individual conferences. Prerequisite: Evolution and Ecology 112, Chemistry 2A, 2B, Physics 7C; Biological Sciences 102 and 103 recommended. Comparative physiology of invertebrate organ systems.

**\*119L. Invertebrate Physiology Laboratory** (3) II. Crowe

Laboratory—6 hours (includes research project). Prerequisite: course 119 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project. Not open for credit to students who have completed course 142L. (Former course 142L.)

**121. Physiology of Reproduction** (3) II. Anderson

Lecture—3 hours. Prerequisite: course 101. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

**121L. Physiology of Reproduction Laboratory**

(1) II. Anderson

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.)

**124. Comparative Neuroanatomy** (4) II. Krubitzer, Recanzone

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.)

**125. Comparative Physiology: Neurointegrative Mechanisms** (3) III. Woolley

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. Not open for credit to students who have completed course 120A. (Former course 120A.)

**126. Comparative Physiology: Sensory Systems** (3) II. Sillman

Lecture—3 hours. Prerequisite: course 100 or 101. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechano-sensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors. Not open for credit to students who have completed course 120F. (Former course 120F.)

**127. Comparative Physiology: Circulation** (3) II. Weidner

Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.

**128. Comparative Physiology: Endocrinology**

(3) II. Moberg, Chang

Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: animal hormones and their functions. Not open for credit to students who have completed course 120D. (Former course 120D.)

**\*129. Comparative Physiology: Respiration** (3) II. Cech

Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: respiration. Offered in alternate years. Not open for credit to students who have completed course 120E. (Former course 120E.)

**130. Physiology of the Endocrine Glands** (4) I. Adams

Lecture—4 hours. Prerequisite: course 101. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease.

**140. Principles of Environmental Physiology**

(3) II. Fuller

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.)

**141. Physiological Adaptation of Marine Organisms** (4) III. Clegg (Molecular and Cellular Biology), Chang

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Biological Sciences 102 and 103; Biological Sciences 123 (concurrently); Physics 7A-7B-7C. Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (See "Division-wide Programs" for Bodega Marine Laboratory Program.)

**141P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics** (6) III. Clegg (Molecular and Cellular Biology), Chang Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 141 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 141 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See "Division-wide Programs" for Bodega Marine Laboratory Program.)

**150. Advanced Animal Behavior** (4) II. Owings, Clayton  
Lecture—3 hours; laboratory—2 hours. Prerequisite: Psychology 101 or course 102. 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 150.)

**152. Hormones and Behavior** (3) III. Barkley, Mendoza  
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 152.)

**\*160. Advanced Cellular Neurobiology** (4) II. Mulloney and Wilson  
Lecture—3 hours; independent study—1 hour. Prerequisite: Biological Sciences 101, 102, 104, course 100, or consent of instructor; Physics 7C recommended. Neuronal structure; ion channels; synapses, transmitters and transmitter pharmacology; receptors; neuronal modulation and circuit dynamics. Not open for credit to students who have completed course 143. (Former course 143.)

**\*160L. Advanced Cellular Neurobiology Laboratory** (4) II. Mulloney  
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. Not open for credit to students who have completed course 143L. (Former course 143L.)

**161. Developmental Neurobiology** (3) III. Chalupa  
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.

**162. Neural Mechanisms of Behavior** (3) III. Britten  
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.

**163. Mathematical Models in Neuroscience and Psychology** (4) II. Olshausen, Sutter  
Lecture—3 hours; term paper. Prerequisite: Mathematics 16B, Physics 7B; course 100 or Psychology 101. Basic mathematical modeling techniques used in neuroscience and psychology. Specific topics include linear systems theory, Fourier transforms, neural networks, adaptive systems, probabilistic inference and information theory. Emphasis on understanding information processing in neural systems. (Same course as Psychology 163.)

**\*190. Proseminar in Physiology** (3) I, II, III. The Staff (Chairperson in charge)  
Seminar—3 hours. Prerequisite: course 101 and Biological Sciences 104, one additional upper division course in physiology or a related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

**190C. Introduction to Physiological Research** (1) I, II, III. The Staff (Chairperson in charge)  
Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
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 physiology. (P/NP grading only.)

**194HA-194HB-194HC. Neurobiology, Physiology and Behavior-Honors** (1, 1-4, 2) I-II-III. The Staff  
Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.5 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. Course 194HB may be repeated for credit for a total of 8 units. (P/NP grading only.)

**\*196A. Voluntary Control of Physiological Processes** (2) I, II, III. Lorenz  
Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate upper division preparation in at least one of the following: physiology, behavioral science, computer science, physics or electrical engineering; consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (P/NP grading only.)

**\*196B. Voluntary Control of Physiological Processes** (1-4) I, II, III. Lorenz  
Laboratory—3-12 hours. Prerequisite: course 196A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit with a maximum of 6 units for 196A-196B course sequence. (P/NP grading only.)

**197T. Tutoring in Neurobiology, Physiology and Behavior** (1-5) I, II, III. The Staff  
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting in courses in neurobiology, physiology and behavior under the direction of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

## Graduate Courses

**221. Cellular and Molecular Neuroscience** (4) I. Wilson  
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course dealing with the cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning will be covered. (Same course as Neuroscience 221.)

**222. Systems Neuroscience** (4) II. Britten  
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced course covering the integrative and information-processing aspects of nervous system organization. Specific topics to be covered include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neuroscience 222.)

**245. Computational Models of Cellular Signaling** (3) II. Keizer  
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.

**263. Modeling in Systems Neuroscience** (4) II. Sutter  
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.

**291. Auditory Neuroscience** (1) I, II, III. Sutter, Recanzone  
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.)

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## Biological Sciences: Plant Biology

Deborah P. Delmer, Ph.D., Chairperson of the Section

Section Office, 1002 Life Sciences Addition  
(530-752-0617)

World Wide Web: <http://www-plb.ucdavis.edu>

### Committee in Charge of the Major

Deborah Canington, Ph.D. (*Plant Biology*)  
Judy Jernstedt, Ph.D. (*Agronomy and Range Science*), Chairperson  
John Labavitch, Ph.D. (*Pomology*)  
Alan Stemler, Ph.D. (*Plant Biology*)  
Thea Wilkins, Ph.D. (*Agronomy and Range Science*)  
Terence Murphy, Ph.D. (*Plant Biology*)

### Faculty

Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Sections of the Division of Biological Sciences.

### Primary Section Members

John L. Bowman, Ph.D., Assistant Professor  
Anne Britt, Ph.D., Assistant Professor  
Deborah P. Delmer, Ph.D., Professor  
Richard H. Falk, Ph.D., Professor  
John J. Harada, Ph.D., Professor  
William J. Lucas, Ph.D., Professor  
Terence M. Murphy, Ph.D., Professor  
Sharman O'Neill, Ph.D., Associate Professor  
Thomas L. Rost, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Neelima Sinha, Ph.D., Assistant Professor  
Alan J. Stemler, Ph.D., Professor  
Steven M. Theg, Ph.D., Professor  
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*  
Larry N. Vanderhoef, Ph.D., Professor

### Secondary Section Members

Judy Callis, Ph.D., Associate Professor  
Richard S. Criddle, Ph.D., Professor  
James A. Doyle, Ph.D., Professor (*Geology*)  
Marilynn E. Etzler, Ph.D., Professor  
Charles S. Gasser, Ph.D., Professor

R. Marc Learned, Ph.D., Assistant Professor  
 Marcel Rejmanek, Ph.D., Associate Professor  
 Raymond L. Rodriguez, Ph.D., Professor  
 Irwin H. Segel, Ph.D., Professor  
 Maureen L. Stanton, Ph.D., Professor  
 Donald R. Strong, Ph.D., Professor

### Emeriti Faculty

Fredrick T. Addicott, Ph.D., Professor Emeritus  
 Floyd M. Ashton, Ph.D., Professor Emeritus  
 Bruce A. Bonner, Ph.D., Professor Emeritus  
 Herbert B. Currier, Ph.D., Professor Emeritus  
 Emanuel Epstein, Ph.D., Professor Emeritus  
 Ernest M. Gifford, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
 Hendrick J. Ketellapper, Ph.D., Professor Emeritus  
 Donald W. Kyhos, Ph.D., Professor Emeritus  
 Norma J. Lang, Ph.D., Professor Emerita  
 C. Ralph Stocking, Ph.D., Professor Emeritus  
 John M. Tucker, Ph.D., Professor Emeritus  
 Grady Webster, Ph.D., Professor Emeritus  
 Kenneth Wells, Ph.D., Professor Emeritus

### Affiliated Faculty

Deborah Canington, Ph.D., Academic  
 Coordinator/Lecturer  
 Ellen Dean, Ph.D., Academic Coordinator/Lecturer

## Courses in Plant Biology (PLB)

### Lower Division Courses

#### 1. Plants for Garden, Orchard and Landscape

(2) I, III. Marrush (Vegetable Crops)  
 Lecture—1 hour; laboratory—3 hours. For non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagating trees and vines, 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 Agricultural Systems and Environment 2 or Plant Science 1. (Former course Plant Science 1.) (P/NP grading.)

**11. Plants and the Biosphere** (3) I. Falk  
 Lecture—3 hours; one weekend field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in examining our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Intended primarily for non-science majors. GE credit: SciEng, Wrt.

**12. Plants and People** (3) I. Bradford; II. Bennett, Micheltore; III. Nevins (Vegetable Crops)  
 Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. Not open for credit to students who have completed Plant Science 10. (Former course Plant Science 10.) GE credit: SciEng, Div, Wrt.

**90X. Plant Science Seminar** (1-4) I, II, III.  
 The Staff

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 Science 90X. (Former course Plant Science 90X.)

**92. Internship** (1-12) I, II, III. The Staff  
 (Chairperson in charge)

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) I, II, III. The Staff  
 (Chairperson in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge.)  
 Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

For questions about courses numbered 102 through 125, see the Plant Biology Section Office, 1002 Life Sciences Addition. For questions concerning courses numbered 142 through 188, see the Plant Science Advising Center, 152 Hunt Hall.

**102. California Floristics** (5) III. Dean  
 Lecture—2 hours; lecture/discussion—1 hour; laboratory—6 hours (includes three one-day, weekend field trips). Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vascular plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora.

**105. Developmental Plant Anatomy** (5) I. Rost  
 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.

**108. Systematics and Evolution of Angiosperms** (5) III. Doyle  
 Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. 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.

**111. Plant Physiology** (3) I. Stemler  
 Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently); Physics 7A, 7B, 7C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration.

**111D. Problems in Plant Physiology** (1) I. Stemler  
 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.)

**111L. Introductory Plant Physiology Laboratory** (5) III. Murphy  
 Lecture/discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently) or 112 or consent of instructor (both recommended). Introduction to basic experimental techniques and instruments used in the investigation of plant physiological processes, such as photosynthesis, water and solute transport, tissue cultures, and detection of hormones.

**112. Plant Growth and Development** (3) II. Thornton  
 Lecture—3 hours. Prerequisite: Biological Sciences 1C, 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.

**112D. Problems in Plant Growth and Development** (1) II. Thornton  
 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.)

**113. Molecular and Cellular Biology of Plants** (3) III. Harada  
 Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Biological Sciences 102 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.

**113D. Problems in Molecular and Cellular Biology of Plants** (1) III. Harada  
 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.)

**116. Plant Morphology and Evolution** (5) II. Jernstedt  
 Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 1C); plant anatomy recommended (e.g., course 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.

**117. Plant Ecology** (4) I. Pearcy  
 Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; course 112; course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Evolution and Ecology 121. (Same course as Evolution and Ecology 117.)

**118. Introductory Phycology and Bryology** (4) II. Canington  
 Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1C. Comparative morphology, physiology, development and reproduction of cyanobacteria, the major algal groups, and the bryophytes. Focus on structure-function and evolutionary relationships. Ecological factors and commercial uses considered. Laboratory includes study of living organisms and identification exercises.

**121. Biology of Weeds** (3) III. Rejmanek  
 Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures.

**\*123. Plant-Virus-Vector Interaction** (3) I. Lucas, Gilbertson, Ullman  
 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.)

**\*125. Molecular Biology of Plant Development** (3) III. The Staff  
 Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biological Sciences 103; Molecular and Cellular Biology 161 or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues.

**126. Plant Biochemistry** (3) III. Callis, Abel  
 Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent, and Biological Sciences 103. 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.)

**141. Principles and Methods of Ethnobotany** (4) II. Potter (Pomology)  
 Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalent; course



108 recommended. Examination of concepts, questions, and methods in ethnobotany, the study of human-plant interactions. Specific topics include traditional and scientific classification systems, uses of specific plants, plant evolution under domestication, and ethical issues related to ethnobotany. GE credit: SciEng or SocSci, Wrt.

**142. Ecology of Crop Systems** (4) II. Denison (Agronomy and Range Science)

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C; 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. GE credit: SciEng.

**143. Evolution of Crop Plants** (3) III. Gepts (Agronomy and Range Science)

Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Origins of crops and agriculture, including methodological approaches, center of origin and diversity, crop dissemination pathways, and differences between wild and cultivated plants. Group studies of individual crops are published on the Internet. Not open for credit to students who have completed Plant Science 103 (Former course Plant Science 103.) GE credit: SciEng, Wrt.

**144. Trees and Forests** (3) I. Barbour, Berry (Environmental Horticulture), Bledsoe (Land, Air and Water Resources), DeJong (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. 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. (Same course as Environmental and Resource Sciences 144/Environmental Horticulture 144.) Not open for credit to students who have completed Plant Science 106. (Former course Plant Science 106.)

**146. Rhizosphere Ecology** (3) III. Phillips (Agronomy and Range Science)

Lecture—2 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Effects of plant-microbe interactions on plant growth, soil formation, and agricultural sustainability. Physical, chemical and biological processes that occur at the surface of plant roots. Evolution and modification of the biochemical and genetic bases of rhizosphere ecology.

**148. Introductory Mycology** (5) I. MacDonald, Rizzo (Plant Pathology)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. Not open for credit to students who have completed former course 119, Botany/Plant Pathology 119. (Former course 119, Botany/Plant Pathology 119.) (Same course as Plant Pathology 148.)

**\*151. Plant Genetic Resources for Global Crop Production** (3) I. Potter (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1B or 10. Biological and social factors that influence availability of plant genetic resources for discovery of useful new substances and improvement of cultivated plants. Effects of ethical issues, property rights and biological systems on conservation strategies in local and global contexts. GE credit: SciEng, Wrt.

**152. Plant Genetics** (4) I. Wilkins (Agronomy and Range Science)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A 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 for credit to students who have completed Plant Science 105. (Former course Plant Science 105.)

**\*153. Plant, Cell, Tissue and Organ Culture** (4) II. Sutter (Pomology)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years. Not open for credit to students who have completed Plant Science 107. (Former course Plant Science 107.)

**154. Introduction to Plant Breeding** (4) II. St. Clair (Vegetable Crops)

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. (Former course Plant Science 113.)

**157. Physiology of Environmental Stresses in Plants** (3) II. Richards, Läuchli, Silk (Land, Air and Water Resources)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses. Not open for credit to students who have completed Plant Science 126. (Former course Plant Science 126.)

**158. Mineral Nutrition of Plants** (4) III. Richards (Land, Air, and Water Resources), Brown (Pomology)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Plant Biology/Plant Science 135. (Former course Plant Biology/Plant Science 135.)

**160. Principles of Plant Biotechnology** (3) II. Dandekar (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1A and 101. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement. Not open for credit to students who have completed Plant Science 140. (Former course Plant Science 140.)

**161A. Plant Genetics and Biotechnology Laboratory** (4) I. Dandekar (Pomology), Dubcovsky (Agronomy and Range Science)

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Techniques of genetic analysis at the molecular and organismal levels, including segregation and linkage analysis, cytogenetics and recombinant DNA. Not open for credit to students who have completed Plant Science 141A. (Former course Plant Science 141A.)

**161B. Plant Genetics and Biotechnology Laboratory** (4) II. Harada (Plant Biology), Wilkins, (Agronomy and Range Science)

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. 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 completed Plant Science 141B. (Former course Plant Science 141B.)

**171. Plant Propagation** (4) III. Sutter (Pomology)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Science 109. (Former course Plant Science 109.)

**172. Postharvest Physiology and Handling of Horticultural Commodities** (3) I. Kader (Pomology), Reid (Environmental Horticulture), Saltveit (Vegetable Crops)

Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., Agricultural Systems and Environment 2, course 12 or Food Science and Technology 2); concurrent enrollment in course 172L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres. Not open for credit to students who have completed Plant Science 112. (Former course Plant Science 112.)

**172L. Postharvest Physiology and Handling Laboratory** (2) I. Kader (Pomology), Saltveit (Vegetable Crops)

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 172 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 172. Not open for credit to students who have completed Plant Science 112L. (Former course Plant Science 112L.)

**173. Biological Applications in Fruit Tree Management** (2) II. DeJong (Pomology)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalents. Physiology, growth, development and environmental requirements of fruit trees and 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 who have completed Plant Science 115. (Former course Plant Science 115.)

**174. Biological Applications in Fruit Production** (2) III. De Young, Polito (Pomology)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2; course 173 recommended. Reproductive biology of tree-crop species. Biological principles of fruit production, tree nutrition and orchard management. Laboratories emphasize hands-on work with orchard tree systems.

**175. Applied Plant Biology** (4) II. Brown, Labavitch (Pomology)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111, and Biological Sciences 101 or course 152. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and environmental enhancement. Current research, applications, and issues in crop improvement, production and biotechnology will be presented and discussed. Not open for credit to students who have completed Plant Science 145. (Former course Plant Science 145.)

**176. Introduction to Weed Science** (3) II. Bayer

Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B. Principles of weed science including mechanical, biological, and chemical control methods. Weed control in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed former course 120. (Former course 120.)

**177. Action of Herbicides** (3) III. Bayer/Falk

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 176; Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed former course 122. (Former course 122.)

**\*178. Biology and Management of Freshwater Macrophytes** (3) I. Anderson (Weed Science)

Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 8B; course 111 or Hydrologic Science 122 recommended. Brief sur-



vey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in alternate years. Not open for credit to students who have completed former course 150. (Former course 150.)

**188. Undergraduate Research: Proposal (3) III.** Bloom, Yoder (Vegetable Crops)

Lecture/discussion—3 hours. Prerequisite: upper division standing and consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Agricultural Systems and Environment 188.) Not open for credit to students who have completed Plant Science 191, Vegetable Crops 191. (Former course Plant Science 191.)

**189. Experiments in Plant Biology: Design and Execution (3) I, II, III.** The Staff.

Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C 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.)

**190C. Research Conference in Botany (1) I, II, III.** The Staff

Discussion—1 hour. Prerequisite: upper division standing in botany or related discipline; consent of instructor. Introduction to research methods in botany. 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.)

**192. Internship (1-12) I, II, III.** The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Section faculty. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5) I, II, III.** The Staff (Chairperson in charge)

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.)

**196. Postharvest Technology of Horticultural Crops (3) III.** Kader (Pomology) in charge

Lecture/discussion/demonstration—5 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for pre-enrollment. Not open for credit to students who have completed Plant Science 196. (Former course Plant Science 196.) (P/NP grading only.)

**197T. Tutoring in Botany (1-5) I, II, III.** The Staff  
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory or discussion sections. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge.)

Prerequisite: consent of instructor. (P/NP grading only.)

## Biomedical Engineering (A Graduate Group)

Maury L. Hull, Ph.D., Chairperson of the Group  
(530-752-6656 or 752-2611)

Group Office, 1050 Engineering II (Engineering Dean's Office, 530-752-2611)

World Wide Web: <http://www.engr.ucdavis.edu/college/departments/bme/>

**Faculty.** Includes faculty members from the three colleges, and the Schools of Medicine and of Veterinary Medicine.

**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 biology and medical sciences, including modeling of biological systems and the design of devices and procedures useful for human and veterinary medicine. This broad interdepartmental program is best suited for students who are capable 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 such training can be acquired after admission to the Group, but it generally necessitates one or more additional years of study.

**Faculty Advisers.** A. Barakat (*Mechanical Engineering*), M. Buonocore (*Radiology*), M.L. Hull (*Mechanical Engineering*), R. Smith (*Electrical and Computer Engineering*).

## Courses in Biomedical Engineering (BIM)

### Upper Division Course

**126. Tissue Mechanics (3) II.** Hawkins

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.)

### Graduate Courses

**\*210. Introduction to Biomaterials (4) II.**

Shackelford

Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties 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. Offered in alternate years.

**215. Biomedical Fluid Mechanics and Transport Phenomena (4) III.** Barakat

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B or Chemical Engineering 150B or Civil 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, affect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Mechanical Engineering 215.)

**220. Research Topics in Biomechanics (3) III.**

Williams

Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing and consent of instructor; Exercise Science 115 recommended. Survey of current research

into diverse areas of the biomechanics of human movement. Topics will include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, clinical biomechanics. (Same course as Exercise Science 220.) Offered in alternate years.

**223A. Multibody Dynamics I (3) II.** Eke, Hubbard  
Lecture—3 hours. Prerequisite: Engineering 102 or the equivalent, and graduate standing. Dynamics of coupled rigid bodies. Reference frames. Differentiation of vector functions. Multibody kinematics; configuration and motion constraints; holonomicity; non-holonomicity; generalized speeds; partial velocities. Mass and inertia properties, inertia tensor, inertia theorems. Angular momentum; angular momentum theorems. Force systems; generalized forces. (Same course as Mechanical Engineering 223A.) Offered in alternate years.

**223B. Multibody Dynamics II (3) III.** Eke, Hubbard

Lecture—3 hours. Prerequisite: course 223A. Kinematics and dynamics of coupled rigid bodies. Comparison of various methods for obtaining rigid multibody dynamical equations. Newton/Euler formalism. Energy functions; Lagrange's Equations; Kane's method. Computer-aided dynamics of multibody systems. Rigid body orientation; Euler angles; Euler parameters; Rodrigues parameters. (Same course as Mechanical Engineering 223B.) Offered in alternate years.

**225. Spatial Kinematics and Robotics (3) II.**

Cheng

Lecture—3 hours. Prerequisite: Mechanical Engineering 222. Spatial kinematics: Point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: Solving for kinematics equations; differential relationships, motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years. (Same course as Mechanical Engineering 225.)

**227. Research Techniques in Biomechanics (4) II.** Williams, Hawkins

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 Engineering 227/Exercise Science 227.)

**228. Skeletal Muscle Mechanics: Form, Function, Adaptability (4) I.** Hawkins

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.)

**\*231. Musculo-Skeletal System Biomechanics (3) III.** Hull

Lecture—3 hours. Prerequisite: Engineering 102, Mechanical Engineering 176. 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. Offered in alternate years. (Same course as Mechanical Engineering 231.)

**232. Skeletal Tissue Mechanics (3) III.** Martin  
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104. 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 tis-

sues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Mechanical Engineering 232.)

#### 240. Computational Methods in Nonlinear Mechanics (4) II. Sarigul-Klign

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 Aeronautical Science Engineering 240.)

#### 241. Introduction to Magnetic Resonance Imaging (2) I. Buonocore

Lecture—2 hours. Prerequisite: Physics 9D, Mathematics 22B. Introduction to equipment, methods, medical applications of magnetic resonance imaging (MRI). Lectures review basic, advanced pulse sequences, image reconstruction, display and technology and how these are applied clinically. Format: 35 mm slide presentation. Lecture complements more technical course 246, which may be taken concurrently.

#### 242. Survey of Medical Imaging Technology (2) II. Boone, Seibert

Lecture—2 hours; term paper. Prerequisite: graduate student in scientific field or consent of instructor. The various imaging technologies used in medical diagnosis will be studied. These include x-ray radiography, fluoroscopy, computed tomography, mammography, ultrasound imaging, nuclear magnetic resonance imaging, and nuclear medicine imaging. Offered in alternate years.

#### 246. Magnetic Resonance Technology (3) I. Buonocore

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.

#### 247. Current Concepts in Magnetic Resonance Imaging I (3) II. Buonocore

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.

#### 248. Current Concepts in Magnetic Resonance Imaging II (3) III. Buonocore

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.

#### 289A-E. Selected Topics in Biomedical Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

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.

#### 290. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Seminar in biomedical engineering. (S/U grading only.)

#### 290C. Graduate Research Conference (1) I, II, III. The Staff (Hull in charge)

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.)

#### 299. Research (1-12) I, II, III, IV. The Staff (S/U grading only.)

### Professional Course

#### 396. Teaching Assistant Training Practicum

(1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group  
Group Office, 188 Briggs Hall (530-752-9092)

World Wide Web:

<http://www-ggc.ucdavis.edu/ggc/bph>

**Faculty.** Includes faculty members from the Departments of Molecular and Cellular Biology, Chemistry, Physics, and others, and the School of Medicine.

**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 upon by a curriculum committee consisting of a research supervisor, the graduate adviser, and a group member. The Committee meets to consider individual educational needs with the student.

**Graduate Adviser.** R.J. Baskin (*Molecular and Cellular Biology*).

### Courses in Biophysics (BPH)

#### Graduate Courses

#### 200. Current Techniques in Biophysics (2) III. The Staff

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.)

#### 200LA. Biophysics Laboratory (3) I, II, III.

The Staff (Chairperson in charge)  
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.

#### 200LB. Biophysics Laboratory (6) I, II, III.

The Staff (Chairperson in charge)  
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.

#### 231. Biological Nuclear Magnetic Resonance

(3) I. Jue  
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.

#### 290C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge)

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.)

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

#### 299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Biotechnology

(College of Agricultural and Environmental Sciences)

**Faculty.** Faculty includes members of the Departments of Agronomy and Range Science; Animal Science, Environmental Horticulture; Food Science and Technology; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Division of Biological Sciences.

### 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.

**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. Three options, *Animal Biotechnology*, *Plant Biotechnology*, and *Fermentation/Microbial Biotechnology*, 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 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

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

**English Composition Requirement** .....8  
See College requirement

#### Preparatory Subject Matter .....54-60

Biological Sciences 1A-1B-1C .....15  
Chemistry 2A-2B-2C .....15  
Chemistry 8A-8B or 118A-118B-118C or  
128A-128B-128C-129A .....6-12  
Mathematics 16A-16B .....6  
Physics 7A-7B .....8  
Statistics 13, 100, or Agricultural Systems and  
Environment 120 .....4

#### Breadth/General Education .....24

#### Depth Subject Matter .....25-28

Biological Sciences 101, 102, 103, 104 .....13  
Microbiology 102 .....4  
Molecular and Cellular Biology 161 .....3  
Genetics 296 or Plant Pathology 140 .....2-4

Internship or independent research, 192 or 199 .....3  
 Honors Undergraduate Thesis (optional)....1

#### Areas of Specialization (choose one)

##### Fermentation/Microbiology Biotechnology Option .....30-33

Microbiology 140, 150; Microbiology 102L or Food Science and Technology 104L; Molecular and Cellular Biology 160L; Viticulture and Enology 124 or 186.....15-18  
 Restricted Electives.....15  
 Select from: Chemical Engineering 161A, 161B, 161L, Food Science and Technology 104, 104L, 110A, 110B, Microbiology 105, 155L, Molecular and Cellular Biology 170L, Viticulture and Enology 124, 126, 128, 135, 140.

##### Plant Biotechnology Option.....28

Molecular and Cellular Biology 126, Plant Biology 152, 160, 161A, 161B .....18  
 Restricted Electives .....10  
 Select at least one course from each of the areas:  
 (a) *Pests, Pathogens and Production*  
 Agricultural Systems and Environment 118, Entomology 110, Nematology 100 or 110, Plant Pathology 120, Plant Biology 143, 146, 153, 154, 172  
 (b) *Growth and Development*  
 Molecular and Cellular Biology 170L, Plant Biology 105, 111, 112, 157, 158

##### Animal Biotechnology Option .....25

Animal Genetics 111, Neurobiology, Physiology and Behavior 101, Molecular and Cellular Biology 150, 150L .....14  
 Restricted Electives.....11  
 Select at least one course from each of the areas:  
 (a) *Animal cell biology/microbiology/immunology*  
 Animal Genetics 101, Environmental Toxicology 100L, Medical Microbiology 107, Microbiology 102L, Molecular and Cellular Biology 160L, Pathology, Microbiology and Immunology 126, 126L, 128  
 (b) *Animal reproduction and breeding*  
 Animal Genetics 107, Animal Science 131, 140, Avian Sciences 103, 121, Evolution and Ecology 102, Neurobiology, Physiology and Behavior 121, 121L

##### Unrestricted Electives .....27-44

##### Total Units for the Major .....180

**Major Adviser:** A.M. Dandekar (Pomology), 1059 Wickson Hall.

**Advising Center** for the major is located at 152 Hunt Hall.

## Botany

**See Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)**

## Cantonese

**See Asian American Studies**

## Cell and Developmental Biology (A Graduate Group)

Paul FitzGerald, Ph.D., Chairperson of the Group (530-752-7130)

Group Office, 188 Briggs Hall (530-752-9091)

World Wide Web:

<http://www-ggc.ucdavis.edu/ggc/cdb>

**Faculty.** The group includes 40 faculty members from 17 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Cell and Developmental Biology offers programs of study leading to the Ph.D. degree. 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.** J. Natzle (*Molecular and Cellular Biology*), C. Erickson (*Molecular and Cellular Biology*).

## Courses in Cell and Developmental Biology (CDB)

### Graduate Courses

#### 200. Current Techniques in Cell Biology (2) I. Nuccitelli

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, immunochimistry, 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.)

#### 200LA. Cell and Developmental Biology Laboratory (3) I, II, III. The Staff

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.

#### 200LB. Cell and Developmental Biology Laboratory (6) I, II, III. The Staff

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.

#### 205. Cell Biology of the Cytoskeleton (2) I. McNally

Lecture—1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduc-

tion to cytoskeletal proteins: actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (S/U grading only.)

#### 290. Current Topics in Cell and Developmental Biology (1) I, II, III. The Staff (Chairperson in charge)

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.)

#### 290C. Research Conference in Cell and Developmental Biology

(1) I, II, III. The Staff (Chairperson in charge)

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.)

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

#### 299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Cell Biology and Human Anatomy

**See Medicine, School of**

## Chemistry

(College of Letters and Science)

Claude F. Meares, Ph.D., Chairperson of the Department

Dino S. Tinti, Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building (530-752-0503/0953; Fax: 530-752-8995)

### Faculty

Matthew P. Augustine, Ph.D., Assistant Professor  
 Alan L. Balch, Ph.D., Professor

R. David Britt, Ph.D., Professor

Thorsten Dieckmann, Ph.D., Assistant Professor

Timothy C. Donnelly, Ph.D., Lecturer, *Academic*

*Federation Excellence in Teaching Award*

W. Ronald Fawcett, Ph.D., Professor

William H. Fink, Ph.D., Professor

Andrew J. Fisher, Ph.D., Assistant Professor

Constantine Issidorides, Ph.D., Lecturer

William M. Jackson, Ph.D., Professor

Philip G. Jessop, Ph.D., Assistant Professor

Susan M. Kauzlarich, Ph.D., Professor

Joel E. Keizer, Ph.D., Professor

Peter B. Kelly, Ph.D., Associate Professor

Mark J. Kurth, Ph.D., Professor

Gerd N. LaMar, Ph.D., Professor

Donald P. Land, Ph.D., Associate Professor

Carlito B. Lebrilla, Ph.D., Professor

Claude F. Meares, Ph.D., Professor

R. Bryan Miller, Ph.D., Professor

Tadeusz F. Molinski, Ph.D., Professor

Krishnan P. Nambiar, Ph.D., Associate Professor

Michael H. Nantz, Ph.D., Associate Professor

C. Tayhas R. Palmore, Ph.D., Assistant Professor

Timothy E. Patten, Ph.D., Assistant Professor

Philip P. Power, Ph.D., Professor

Peter A. Rock, Ph.D., Professor

Carl W. Schmid, Ph.D., Professor

Neil E. Schore, Ph.D., Professor, *Academic Senate*

*Distinguished Teaching Award*



Ben Shen, Ph.D., Assistant Professor  
 Kevin M. Smith, Ph.D., Professor  
 Alexei P. Stuchebukhov, Ph.D., Associate Professor  
 Dino S. Tinti, Ph.D., Professor  
 Nancy S. True, Ph.D., Professor  
 Susan C. Tucker, Ph.D., Associate Professor  
 Fred E. Wood, Ph.D., Lecturer

### Emeriti Faculty

Thomas L. Allen, Ph.D., Professor Emeritus  
 Lawrence J. Andrews, Ph.D., Professor Emeritus  
 Albert T. Bottini, Ph.D., Professor Emeritus  
 Hakon Hope, Cand. real., Professor Emeritus  
 Raymond M. Keefer, Ph.D., Professor Emeritus  
 Richard E. Kepner, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
 August H. Maki, Ph.D., Professor Emeritus  
 Donald A. McQuarrie, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
 W. Kenneth Musker, Ph.D., Professor Emeritus  
 Charles P. Nash, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
 Edgar P. Painter, Ph.D., Professor Emeritus  
 Leo H. Sommer, Professor Emeritus  
 James H. Swinehart, Ph.D., Professor Emeritus  
 David H. Volman, 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.** Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science. Students who are interested in chemistry as a profession normally elect the program leading to the B.S. degree, which is accredited by the American Chemical Society. The curriculum leading to an A.B. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as professional school preparation or secondary school teaching.

**Career Alternatives.** Chemistry graduates with bachelor's degrees are employed extensively throughout industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the photographic industry. The bachelor programs also provide chemistry graduates with the rigorous preparation needed for the advanced degrees required for careers in research and education.

## A.B. Major Requirements:

|                                                                                                                         | UNITS        |
|-------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                 | <b>36-39</b> |
| Chemistry 2A-2B-2C or 2AH-2BH-2CH.....                                                                                  | 15           |
| Physics 5A-5B-5C or 7A-7B-7C .....                                                                                      | 12           |
| Mathematics 21A-21B-21C or 16A-16B-16C .....                                                                            | 9-12         |
| <b>Depth Subject Matter</b> .....                                                                                       | <b>39</b>    |
| Chemistry 110A, 110B, 110C, 124A, 128A, 128B, 128C, 129A, 129B .....                                                    | 25           |
| At least 14 additional upper division units in chemistry (except Chemistry 107A or 107B), biochemistry, or physics..... | 14           |
| Total Units for the Major .....                                                                                         | 75-78        |

## B.S. Major Requirements:

|                                                                                                    | UNITS     |
|----------------------------------------------------------------------------------------------------|-----------|
| <b>Preparatory Subject Matter</b> .....                                                            | <b>53</b> |
| Chemistry 2A-2B-2C or 2AH-2BH-2CH.....                                                             | 15        |
| Physics 9A, 9B, 9C, 9D .....                                                                       | 16        |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....                                                     | 22        |
| <b>Depth Subject Matter</b> .....                                                                  | <b>50</b> |
| Chemistry 110A, 110B, 110C, 111, 115, 124A, 124B or 124C, 128A, 128B, 128C, 129A, 129B, 129C ..... | 38        |

At least 12 additional upper division units in chemistry (except Chemistry 107A, 107B), including one course with laboratory work.....12  
 Total Units for the Major.....103

**Major Advisers.** W.H. Fink, R.E. Kepner, M. Nantz, N. True, K.P. Nambiar, N.E. Schore, S. Tucker, F.E. Wood.

**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 the Graduate Studies chapter of this catalog.

## 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 Qualifying 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.

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 Sacramento City College's Chemistry 41C (listed in the *Class Schedule and Room Directory* 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) I.** Donnelly, True, —; II. Kaulzarich, Donnelly, Fisher, Stuchebukhov  
 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.

**2AH. Honors General Chemistry (5) I.** Tinti  
 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.

**2B. General Chemistry (5) II.** Donnelly, Jessop; II. —; III. Land, —, —  
 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.

### 2BH. Honors General Chemistry (5) II.

Augustine  
 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.

### 2C. General Chemistry (5) I.

Power, Tucker; III. Jackson, Kelly  
 Lecture—3 hours; laboratory—6 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 kinetics, electrochemistry, quantitative analysis using instrumental methods, qualitative analysis, and inorganic and organic synthesis. GE credit: SciEng.

**2CH. Honors General Chemistry (5) III.** Fawcett  
 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.

### 8A. Organic Chemistry: Brief Course (2) I, III.

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.

### 8B. Organic Chemistry: Brief Course (4)

I, II. —  
 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.

### \*9. Introduction to General Chemistry (2) I.

The Staff  
 Lecture/discussion—3 hours. Prerequisite: chemistry diagnostic examination; not open for credit to students who have passed the exam or completed course 2A or 2AH. Introduction to chemistry. Students who complete course 9 will receive only 3 units credit for course 2A. Course 9 must be taken for a letter grade and may not be repeated

### 10. Concepts of Chemistry (4) II.

Wood  
 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.

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only)

## Upper Division Courses

### 107A. Physical Chemistry for the Life Sciences (3) I.

Fink  
 Lecture—3 hours. Prerequisite: course 2C or consent of instructor. Mathematics 16C or 21C; one year of college level physics. A basic course in physical chemistry intended for majors in the life science areas. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of nonelectrolytes. Kinetic theory of gases and liquids. Transport processes in liquids and solutions.



**107B. Physical Chemistry for the Life Sciences** (3) II. Fink, \_\_\_\_\_

Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloidal systems. Considerations on bioirreversible processes.

**108. Physical Chemistry of Macromolecules** (3) III. Schmid

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.

**110A. Physical Chemistry: Thermodynamics** (3) I. Lebrilla; III. Tinti

Lecture—3 hours. Prerequisite: course 2C, Mathematics 16C or 21C; one year of college physics. Development and application of the principles of chemical thermodynamics.

**110B. Physical Chemistry: Quantum Mechanics** (3) I. Jackson; II. True

Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

**110C. Physical Chemistry: Kinetics** (3) II. Kelly; III. Tucker

Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

**111. Physical Chemistry: Methods and Applications** (4) I. Land; III. True

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 110C (may be taken concurrently) and 115. Introduction to the chemical literature, methods of data analysis, techniques of physical measurements, vacuum systems. Laboratory experiments from the areas of thermodynamics, spectroscopy, and kinetics. GE credit: SciEng, Wrt.

**115. Instrumental Analysis** (4) II. Fawcett

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Theory and practice of modern instrumental techniques of chemical analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples having practical significance. GE credit: SciEng, Wrt.

**118A. Organic Chemistry for Health and Life Sciences** (4) I. \_\_\_\_\_, \_\_\_\_\_; II. Palmore

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.

**118B. Organic Chemistry for Health and Life Sciences** (4) II. Schore, \_\_\_\_\_; III. \_\_\_\_\_

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.

**118C. Organic Chemistry for Health and Life Sciences** (4) I. \_\_\_\_\_; III. \_\_\_\_\_

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,  $\beta$ -dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.

**\*120. Physical Chemistry Laboratory: Advanced Methods** (3) II. Kelly

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110C and 111. Design of experiments;

experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments. Offered in alternate years.

**121. Introduction to Molecular Structure and Spectra** (4) III. La Mar

Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

**124A. Inorganic Chemistry: Fundamentals** (3) I. Jessop

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.

**124B. Inorganic Chemistry: Main Group Elements** (3) II. Balch

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heteroorganic molecules containing the main group elements.

**124C. Inorganic Chemistry: d and f Block Elements** (3) III. Kauzlarich

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

**128A. Organic Chemistry** (3) I. Molinski; II. Nambiar

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.

**128B. Organic Chemistry** (3) II. Nantz; III. Patten

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.

**128C. Organic Chemistry** (3) I. Nantz; II. Schore

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.

**129A. Organic Chemistry Laboratory** (2) I, II. Nambiar

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.

**129B. Organic Chemistry Laboratory** (2) II. Kurth; III. Molinski

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.

**129C. Organic Chemistry Laboratory** (2) I. Schore; III. Shen

Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.

**130. Qualitative Organic Chemistry** (4) III. Miller

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 128C, 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

**131. Modern Methods of Organic Synthesis** (3) II. Zweifel

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.

**\*140. Synthetic Methods** (4) III. Power  
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 124A, 128C, 129C. Integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a wide range of methods. Offered in alternate years.

**150. Chemistry of Natural Products** (3) I. Shen  
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.

**192. Internship in Chemistry** (1-6) I, II, III.

The Staff (Chairperson in charge)  
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) I-II-III. The Staff (Chairperson in charge)

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. Industrial Chemistry** (1) I. Kurth  
Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only.)

**197. Projects in Chemical Education** (1-4) I, II, III. The Staff (Chairperson in charge)

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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

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) I. Kelly

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.

**205. Symmetry, Spectroscopy, and Structure** (3) II. Jackson

Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

**210A. Quantum Chemistry: Introduction and Stationary-State Properties** (3) II. Tinti

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.

**210B. Quantum Chemistry: Time-Dependent Systems** (3) III. Stuchebrukhov

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.

**210C. Quantum Chemistry: Molecular Spectroscopy** (3) I. Augustine

Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics.

**211A. Advanced Physical Chemistry: Statistical Thermodynamics** (3) I. Britt

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.

**211B. Statistical Mechanics** (3) II. Tucker

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.

**\*212. Chemical Dynamics** (3) II. The Staff

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.

**\*215. Theoretical and Computational Chemistry** (3) III. Fink

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.

**216. Magnetic Resonance Spectroscopy** (3) III. Dieckmann

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.

**217. X-Ray Structure Determination** (3) III. Fisher

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.

**\*218. Physical Principles of Macromolecular Structure** (3) III. Meares

Lecture—3 hours. Prerequisite: course 211A 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.

**\*219. Spectroscopy of Organic Compounds** (3) I. Patton

Lecture—3 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. Offered in alternate years.

**\*221A-H. Special Topics in Organic Chemistry** (3) I. The Staff

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.

**226. Principles of Transition Metal Chemistry** (3) I. Balch

Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

**228A. Bio-inorganic Chemistry** (3) III. The Staff  
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) III.

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 (next offering Spring 1999).

**\*228C. Solid-State Chemistry** (3) III. Kauzlarich  
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 (next offering Spring 2001).

**231. Organic Synthesis: Methods and Strategies** (3) III. Nantz

Lecture—3 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling relative stereochemistry, and controlling absolute stereochemistry. Retrosynthetic strategies will be discussed throughout the lectures.

**233. Physical-Organic Chemistry** (3) II. Palmore  
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.

**\*235. Organometallic Chemistry in Organic Synthesis** (3) III. The Staff

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.

**236. Chemistry of Natural Products** (3) II. Miller  
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.

**\*237. Bio-organic Chemistry** (3) I. Nambiar  
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.

**240. Advanced Analytical Chemistry** (3) I. Fawcett

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 spe-

cific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.

**241A-D. Special Topics in Analytical Chemistry** (3) III. Lebrilla

Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each time course is offered.

**261. Current Topics in Chemical Research** (2) I, II, III. The Staff

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.

**263. Introduction to Chemical Research Methodology** (3) I, II, III. The Staff

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.)

**264. Advanced Chemical Research Methodology** (6) I, II, III. The Staff

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.)

**290. Seminar** (2) I, II, III. Fisher

Seminar—2 hours. Prerequisite: consent of instructor. (S/U grading only.)

**293. Introduction to Chemistry Research** (1) I. The Staff (La Mar in charge)

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.)

**295. Industrial Chemistry** (1) I. Kurth

Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff

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.)

**392. Advanced Methods of Teaching Chemistry** (2) III. The Staff

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.)

## Chicana/Chicano Studies

(College of Letters and Science)

Yvette Flores-Ortiz, Ph.D., Program Director

Griselda Castro, Program Coordinator/Student Affairs (530-752-2492)

Program Office, Hart Hall, 2nd Floor (530-752-2421)

World Wide Web: <http://cougar.ucdavis.edu/chi>

### Committee in Charge

Richard Berteaux, Ph.D. (*Environmental Design*)

Angie C. Chabram-Dernersesian, Ph.D. (*Chicana/o Studies*)

Yvette Flores-Ortiz, Ph.D. (*Chicana/o Studies*)

Rosa Linda Fregoso, Ph.D. (*Women's Studies*)

Malaquias Montoya, B.F.A. (*Chicana/o Studies*)

Lorena Oropeza, Ph.D. (*History*)

Beatriz Pesquera, Ph.D. (*Chicana/o Studies*)

Adaljiza Sosa-Riddell, Ph.D. (*Chicana/o Studies*)

### Faculty

Angie C. Chabram-Dernersesian, Ph.D., Associate Professor

Yvette Flores-Ortiz, Ph.D., Associate Professor

Malaquias Montoya, Professor

Beatriz Pesquera, Ph.D., Associate Professor

Adaljiza Sosa-Riddell, Ph.D., Senior Lecturer

### The Major Program

The Chicana/Chicano Studies Program offers an interdisciplinary curriculum focusing on the Chicana/Chicano experience through an analysis of class, race, ethnicity, gender and sexuality, and cultural expression. The program 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, society 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.

## Chicana/Chicano (Mexican-American) Studies

### A.B. Major Requirements:

Cultural Studies Emphasis:

|                                                                                                                              | UNITS        |
|------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                      | <b>16-31</b> |
| Chicana/o Studies 10, 50.....                                                                                                | 8            |
| Chicana/o Studies 21 or 30.....                                                                                              | 4            |
| One of Chicana/o Studies 60, 70, or 73.....                                                                                  | 4            |
| Spanish 1, 2, 3, or 28, 31, 32 or the equivalent.....                                                                        | 0-15         |
| <b>Depth Subject Matter</b> .....                                                                                            | <b>40</b>    |
| Chicana/o Studies 100.....                                                                                                   | 4            |
| History 169A or 169B.....                                                                                                    | 4            |
| Two courses from Chicana/o Studies 110, 111, 120, 122, 131, or 132.....                                                      | 8            |
| Comparative ethnicity/gender: two upper division courses selected from two of the following areas.....                       | 8            |
| African American Studies, Asian American Studies, Native American Studies, or Women's Studies.                               |              |
| A minimum of 16 units from the following areas:.....                                                                         | 16           |
| Three courses from Chicana/o Studies 154, 155, 156, 171, 172.....                                                            | 12           |
| One course from Anthropology 113, 130, 146, Linguistics 166, 167, Native American Studies 180, Women's Studies 160, 180..... | 4            |
| <b>Total Units for the Major</b> .....                                                                                       | <b>56-71</b> |

Social/Policy Studies Emphasis:

|                                                                                                                 | UNITS        |
|-----------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                         | <b>20-35</b> |
| Chicana/o Studies 10, 50.....                                                                                   | 8            |
| Chicana/o Studies 21 or 30.....                                                                                 | 4            |
| One of Chicana/o Studies 60, 70, or 73.....                                                                     | 4            |
| Sociology 46A or Psychology 41.....                                                                             | 4            |
| Spanish 1, 2, 3, or 28, 31, 32 or the equivalent.....                                                           | 0-15         |
| <b>Depth Subject Matter</b> .....                                                                               | <b>40</b>    |
| Chicana/o Studies 100.....                                                                                      | 4            |
| History 169A or 169B.....                                                                                       | 4            |
| Two courses from Chicana/o Studies 154, 155, 171, or 172.....                                                   | 8            |
| Comparative ethnicity/gender: two upper division courses selected from two of the following areas.....          | 8            |
| African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies       |              |
| A minimum of 16 units from the following areas:.....                                                            | 16           |
| Three courses from Chicana/o Studies 110, 111, 120, 121, 130, 131, or 132.                                      |              |
| One course from Anthropology 130, 144, 146, Education 151, Native American Studies 120, 133, Sociology 134..... | 4            |
| <b>Total Units for the Major</b> .....                                                                          | <b>60-75</b> |

Master Adviser. Y. Flores-Ortiz.

Major Advisers. *Humanities/Arts emphasis:* A.C. Chabram-Dernersesian, M. Montoya. *Social Science emphasis:* A. Sosa-Riddell, B. Pesquera.

### 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     |
|---------------------------------------------------|-----------|
| <b>Chicana/o (Mexican-American) Studies</b> ..... | <b>24</b> |
| Chicana/o Studies 10 or 50.....                   | 4         |
| History 169A or 169B.....                         | 4         |

Four courses from Chicana/o Studies 110, 111, 120, 121, 122, 130, 131, 132, 154, 155, 156, 171, 172.....16

Minor Adviser. M. Montoya.

## Courses in Chicana/o Studies (CHI)

### Lower Division Courses

#### 10. Introduction to Chicana/o Studies (4) I.

Sosa-Riddell; III. Pesquera

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.

#### 21. Chicana/o and Latina/o Health Care Issues (4) I.

Flores-Ortiz

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.

#### \*30. United States Political Institutions and Chicanas/os (4) II.

Sosa-Riddell

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.

#### 50. Chicana and Chicano Culture (4) II.

Chabram-Dernersesian; III. The Staff

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.

#### \*60. Chicana and Chicano Representation in Cinema (4) I, III.

Fregoso

Lecture—8 hours. Introductory-level study of Chicana and Chicano representation. The depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. Offered in alternate years.

#### 70. Survey of Chicana/o Art (4) I.

Montoya

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.

#### 73. Chicana/o Art Expression Through Silk Screen (4) I.

Montoya

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.

#### 98. Directed Group Study (1-5) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

#### 100. Chicana/Chicano Theoretical Perspective (4) II.

Angie Chabram-Dernersesian (Director in charge)

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.



**110. Sociology of the Chicana/o Experience** (4) III. Pesquera

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.

**111. Chicanas/Mexicanas in Contemporary Society** (4) II. Pesquera

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.

**120. Chicana/o Psychology** (4) III. Flores-Ortiz

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.

**121. Chicana/o Community Mental Health** (4) I. The Staff

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. GE credit: SocSci, Div, Wrt.

**122. Psychology Perspectives Chicana/o and Latina/o Family** (4) II. Flores-Ortiz

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.

**130. United States-Mexican Border Relations** (4) I. Sosa-Riddell

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.

**131. Chicanas in Politics and Public Policy** (4) I. Sosa-Riddell

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.

**132. Political Economy of Chicana/o Communities** (4) I. Sosa-Riddell

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.

**154. The Chicana/o Novel** (4) II.

Chabram-Dernersesian  
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.

**155. Chicana/o Theater** (4) I. Dernersesian

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.)

**\*156. Chicana/o Poetry** (4) III.

Chabram-Dernersesian  
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.)

**\*165. Chicanas, Latinas and Mexicanas in Commercial Media** (4) I. Fregoso

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.

**171. Mexican and Chicano Mural Workshop** (4) III. Montoya

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 once for credit. (Same course as Art Studio 171.)

**172. Chicana/o Voice/Poster Silk Screen Workshop** (4) II. Montoya

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 once for credit.

**192. Internship in Chicana/o and Latina/o Community** (4) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour; internship—11 hours. Prerequisite: one course from 10, 21, 50, Spanish 3, or the equivalent. Combines academic guidance with internship in community agencies serving Mexican/Latino/Chicano clients. Utilization of bilingual skills, knowledge of history, culture, economics, politics, social issues and work experience. Internship project required. May be repeated twice to a maximum of 12 units. (P/NP grading only.)

**194HA-194HB-194HC. Senior Honors Research Project** (2-5) I, II, III. The Staff

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) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)  
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

**Graduate Courses****230. Chicano/Latino Hispanic Politics** (4) III.

Riddell  
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.

**298. Group Study for Graduate Students** (1-5) III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

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## Child Development (A Graduate Group)

Keith Barton, Ph.D., Chairperson of the Group  
Group Office, 1303 Hart Hall (530-752-1926)

World Wide Web: <http://hcd.ucdavis.edu/caes/hcd/graduate/CDCContents.html>

**Faculty.** Includes faculty members from the division of Human Development and the departments of Anthropology, Education, Psychology, and the Schools of Law and of Medicine.

**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.

Admission applications must be in by *April 1*.

**Graduate Adviser.** Contact Group Office.

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## Chinese

**See Asian American Studies; East Asian Languages and Cultures; and East Asian Studies**



## Classics

(College of Letters and Science)

David A. Traill, Ph.D., Program Director  
Department Office (Spanish and Classics), 616  
Sproul Hall (530-752-0835)

World Wide Web: <http://classics.ucdavis.edu>

### Faculty

Don P. Abbott, Ph.D., Associate Professor (*English, Classics*)

Charlayne Allan, M.A., Lecturer

Emily Albu, Ph.D., Assistant Professor

Patricia Bulman, Ph.D., Lecturer (*Comparative Literature*)

Lynn E. Roller, Ph.D., Professor

Bruce Rosenstock, Ph.D., Lecturer

Peter M. Schaeffer, Ph.D., Professor (*German*)

Seth L. Schein, Ph.D., Professor (*Comparative Literature*)

David A. Traill, Ph.D., Professor

### Emeriti Faculty

Richard E. Grimm, Ph.D., Professor Emeritus

Wesley E. Thompson, Ph.D., Professor Emeritus

### Affiliated Faculty

Lincoln D. Hurst, Ph.D., Associate Professor  
(*Religious Studies*)

Naomi Janowitz, Ph.D., Associate Professor  
(*Religious Studies*)

Larry I. Peterman, Ph.D., Professor (*Political Science*)

Stylios Spyridakis, Ph.D., Professor (*History*)

Michael Wedin, Ph.D., Professor (*Philosophy*)

## The Major Programs

Classical Civilization is an interdisciplinary major that examines the ancient Mediterranean cultures of Greece, Rome and the Near East, with courses offered on the 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 choose Latin and Greek as their languages. 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 School and practically all have been accepted. Additional career options include library and museum work, teaching, journalism, and graduate study in Classics, art, archaeology, history, philosophy and religion.

## Classical Civilization

### A. B. Major Requirements:

UNITS

*Classical and Mediterranean Civilizations track*

#### Preparatory Subject Matter .....30-31

Latin 1-2-3, or Greek 1-2-3, or Hebrew 1-2-3 ..... 15

Two courses from Classics 1, 2, 3 ..... 8

Two additional courses from: Art History 1A; Classics courses 1 through 50 (except 30 and 31); Comparative Literature 1; Philosophy 21; Religious Studies 21, 40 ..... 7-8

#### Depth Subject Matter .....36

Upper division courses in Latin, Greek or Hebrew ..... 12

Five additional courses selected from at least three of the following groups ..... 20

##### (a) Literature:

Additional upper division courses in Latin, Greek and Hebrew; Classics 102, 140, 141, 142, 143; Religious Studies 141A, 141B, 141C

##### (b) History:

History 102A, 111A, 111B, 111C; Religious Studies 102, 122

##### (c) Art, Archaeology and Drama:

Classics 171, 174, 175; Art History 154A, 154B, 155

##### (d) Rhetoric, Philosophy and Political Theory:

Classics 110, 150; Political Science 118A; Philosophy 143, 160, 161, 162

Classics 190 ..... 4

#### Total Units for the Major .....66-67

(Classical and Mediterranean Civilizations track)

UNITS

*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

Two additional courses selected from any of the following groups ..... 8

##### (a) Literature:

Additional upper division courses in Latin, Greek and Hebrew; Classics 102, 140, 141, 142, 143; Religious Studies 141A, 141B, 141C

##### (b) History:

History 102A, 111A, 111B, 111C; Religious Studies 102, 122

##### (c) Art, Archaeology and Drama:

Classics 171, 174, 175; Art History 154A, 154B, 155

##### (d) Rhetoric, Philosophy and Political Theory:

Classics 110, 150; Political Science 118A; Philosophy 143, 160, 161, 162

Classics 190 ..... 4

#### Total Units for the Major .....70

(Classical Languages and Literatures track)

Major Advisers. D.A. Traill, L.E. Roller.

### Greek

*Admission to the undergraduate major in Greek has been suspended. Courses in Greek continue to be offered and may be applied toward majors such as Classical Civilization.*

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter .....0-15

Greek 1, 2, 3 (or the equivalent) ..... 15

#### Depth Subject Matter .....36

Upper division units in Greek (two courses may be chosen from department-approved courses in related fields).

#### Total Units for the Major .....36-51

#### Recommended

Latin 1, 2, 3.

### Latin

*Admission to the undergraduate major in Latin has been suspended. Courses in Latin continue to be offered and may be applied toward majors such as Classical Civilization.*

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter .....15

Latin 1, 2, 3 (or the equivalent) ..... 15

#### Depth Subject Matter .....36

Latin 121 ..... 5

At least 31 additional upper division units in Latin ..... 31

Total Units for the Major ..... 36-51

## 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

Three additional upper division courses selected from any of the groups (a) through (d) in the Classical Civilization major ..... 12

UNITS

#### Greek .....21

Greek 3 ..... 5

Four upper division courses in Greek ..... 16

UNITS

#### Latin .....21

Latin 3 ..... 5

Four upper division courses in Latin ..... 16

**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 Classics (CLA)

### Lower Division Courses

#### 1. The Ancient Near East and Early Greece:

**3000-500 B.C.E.** (4) II. Roller

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.

#### 2. Ancient Greece and the Near East: 500 to

**146 B.C.E.** (4) III. Traill

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.

#### 3. Rome and the Mediterranean: 1000 B.C.E. to

**500 C.E.** (4) I. Abbott

Lecture—3 hours; term paper. Introduction to the history, literature and art and the political and social institutions and values of Roman civilization, with emphasis on Rome's interactions with its Mediterranean neighbors—Etruscans, Carthaginians, Greeks, Egyptians,

and Persians—and on the rise of Christianity. GE credit: ArtHum, Wrt.

**10. Greek, Roman, and Near Eastern Mythology** (3) I, III. Allan

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.

**15. Women in Classical Antiquity** (4) III. Allan  
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.

**\*20. Pompeii AD 79** (4) III. Traill

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) I, III. P. Schaeffer

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.

**\*31. Greek and Latin Elements in Technical Vocabulary** (3) III. The Staff

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) II. Rosenstock

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.

**Upper Division Courses**

**102. Film and the Classical World** (4) II. Albu  
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.

**110. Origins of Rhetoric** (4) III. Abbott  
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.

**\*140. Homer and Ancient Epic** (4) I. Schein  
Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of *Iliad*, *Odyssey*, 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.

**141. Greek and Roman Comedy** (4) III. Albu  
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.

**\*142. Greek and Roman Novel** (4) III. Schein  
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.

**\*143. Greek Tragedy** (4) III. Traill

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.

**150. Socrates and Classical Athens** (4) II. Traill  
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.

**\*171. Mediterranean Bronze Age Archaeology** (4) I. Roller

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.

**\*174. Greek Religion and Society** (4) II. Roller

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.

**\*175. Topography and Monuments of Ancient Athens** (4) III. Roller

Lecture/discussion—4 hours. Prerequisite: course 17A-17B or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary to excavation evidence. Offered in alternate years.

**190. Senior Seminar** (4) II. Schaeffer  
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.

**197TC. Community Tutoring in Classical Languages** (1-5) I, II, III. The Staff

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.)

**Graduate Courses**

**\*201. Introduction to Classical Philology** (4) I. Traill

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) II. Roller

Seminar—3 hours; term paper. Readings in the *Iliad* and *Odyssey*: the origins and transmission of the poems.

**\*203. Vergil** (4) I. Traill

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.

**\*204. Greek and Roman Comedy** (4) II. The Staff  
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) III. Traill  
Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

**\*206. Greek Historiography** (4) II.  
Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

**\*207. Greek Drama** (4) II. The Staff  
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) I, II, III. The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

**Courses in Greek (GRK)**

**Lower Division Courses**

**1. Elementary Greek** (5) I. Bulman, Traill  
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.)

**2. Elementary Greek** (5) II. Bulman  
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

**2NT. Elementary New Testament Greek** (1) II. The Staff  
Lecture—1 hour. Prerequisite: course 2 (concurrently). Supplementary study of New Testament Greek.

**3. Intermediate Greek** (5) III. Traill  
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Greek authors.

**3NT. Elementary New Testament Greek** (1) III. The Staff  
Lecture—1 hour. Prerequisite: course 3 (concurrently). Supplementary study of New Testament Greek.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in Charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**100. Attic Orators** (4) I. Albu  
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*101. Plato** (4) I. Bulman  
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**102. Euripides** (4) III. Roller  
Lecture—3 hours; term paper. Prerequisite: course 101. GE credit: ArtHum, Wrt.

**103A. Homer: Iliad** (4) II. Traill  
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*103B. Homer: Odyssey** (4) III. Roller  
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*104. Menander** (4) III. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*105. Demosthenes** (4) III. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*111. Sophocles** (4) II. Schein  
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.

**\*112. Aristophanes** (4) III. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.

**\*113. Thucydides** (4) III. Roller  
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*114. Lyric Poetry** (4) III.  
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*115. Aeschylus** (4) II. Schein  
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*116. Herodotus** (4) II. Roller  
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

**Courses in Latin (LAT)**

**Lower Division Courses**

**1. Elementary Latin** (5) I. The Staff  
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.)

**2. Elementary Latin** (5) II, III. The Staff  
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

**\*2X. Intensive Latin** (10) III. The Staff  
Lecture—10 hours. Prerequisite: course 1. Intensive course that covers the ground of courses 2 and 3 in a single quarter. Those who have completed course 2 may receive only 5 units for course 2X.

**3. Intermediate Latin** (5) III. The Staff  
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Latin authors.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**\*100. Ovid** (4) III. Traill  
Lecture—3 hours; paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid. GE credit: ArtHum, Wrt.

**\*101. Livy** (4) II. Traill  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*102. Roman Comedy** (5) I. The Staff  
Lecture—4 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**103. Vergil: Aeneid** (4) II. Schein  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*104. Sallust** (4) II. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*105. Catullus** (4) I. Allan  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**106. Horace: Odes and Epodes** (4) III. Albu  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*108. Horace: Satires and Epistles** (4) I. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*109. Roman Elegy** (4) III. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**110. Caesar** (4) I. Albu  
Lecture—3 hours; substantial paper. Prerequisite: course 3. Translation and discussion of selected readings from Caesar. Grammar review and introduction to Latin prose composition. Offered in alternate years. GE credit: ArtHum, Wrt.

**111. Silver Age Latin** (4) I. Albu  
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.

**112. Cicero: Political Writings** (4) II. Schaeffer  
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

**\*114. Cicero: Philosophical Works** (4) II. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*115. Lucretius** (4) II. Schaeffer  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*116. Vergil: Eclogues and Georgics.** (4) II. Traill  
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*121. Prose Composition** (5) I. Traill  
Lecture—4 hours; term paper.

**125. Medieval Latin** (4) III. Traill  
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.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

**Clinical Nutrition and Metabolism**

See Internal Medicine in Medicine, School of

**Clinical Psychology**

See Medicine, School of

**Communication**

(College of Letters and Science)  
———, Chairperson of the Department  
Department Office, 108 Sproul Hall (530-752-1222)  
World Wide Web: <http://hume.ucdavis.edu/rcm>

**Faculty**

Rina Alcalay, Ph.D., Associate Professor  
Robert A. Bell, Ph.D., Professor  
Charles R. Berger, Ph.D., Professor  
Michael T. Motley, Ph.D., Professor  
John L. Vohs, M.A., Senior Lecturer

**Emeriti Faculty**

James J. Murphy, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
Ralph S. Pomeroy, Ph.D., Professor Emeritus

**Affiliated Faculty**

John Theobald, M.A., Lecturer  
Karen Williams, Ph.D., Lecturer

**The Major Program**

The major in communication focuses on the ways human beings produce and respond to verbal and nonverbal messages.

**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.

**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     |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                 | <b>21</b> |
| Anthropology 4 or Linguistics 1 .....                                                                                                                                                                   | 4         |
| Communication 1 or 3 .....                                                                                                                                                                              | 4         |
| Psychology 1 .....                                                                                                                                                                                      | 4         |
| Sociology 1 .....                                                                                                                                                                                       | 5         |
| Statistics 13 .....                                                                                                                                                                                     | 4         |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                       | <b>44</b> |
| Communication theory, Communication 114 .....                                                                                                                                                           | 4         |
| Message codes and research methods, Communication 115 and one of 103 or 105 or 135 .....                                                                                                                | 8         |
| Social interaction studies, Communication 134 and one of 130 or 136 .....                                                                                                                               | 8         |
| Mass communication processes and effects, Communication 141, and one of 143 or 145 or 152 .....                                                                                                         | 8         |
| Select four of the following additional courses with approval of faculty adviser (the four courses must be other than those chosen to fulfill the above requirements) .....                             | 16        |
| Communication 103, 105, 130, 135, 136, 138, 140, 142A, 142B, 143, 145, 152, 161, Anthropology 117, 120, Linguistics 163, 171, Political Science 164, 165, Psychology 132, Sociology 126, 128, 135, 148. |           |
| <b>Total Units for the Major</b> .....                                                                                                                                                                  | <b>65</b> |

**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.** Staff adviser, Susie Johnson, 107 Sproul Hall; Peer adviser, 113 Sproul Hall.

**Minor Program Requirements:**

|                                                                                                           |           |
|-----------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                           | UNITS     |
| <b>Communication</b> .....                                                                                | <b>24</b> |
| One course from Communication 1, 3 .....                                                                  | 4         |
| At least five upper division courses in communication selected with the approval of a minor adviser ..... | 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.** R. Bell.

**Subject A.** Students must have satisfied the Subject A requirement before taking any course in Communication.

## Courses in Communication (RCM)

(Formerly courses in Rhetoric and Communication.)

### Lower Division Courses

**1. Introduction to Public Speaking** (4) I, II, III. Williams

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).

**3. Interpersonal Communication Competence** (4) I, II, III. Vohs

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.

**\*90X. Lower Division Seminar** (1-4) I, II, III. The Staff (Chairperson in charge)

Seminar—1-4 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Communication through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May not be repeated for credit. Limited enrollment.

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**103. Analysis of Message Systems** (4) I, II. Williams

Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations. GE credit: SocSci.

**105. Semantic and Pragmatic Functions of Language** (4) II. Williams; III. Motley

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.

**114. Contemporary Theories of Human Communication** (4) I, III. Williams

Lecture/discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypothesis, general models, theories, and research. GE credit: SocSci.

**115. Empirical Methods in Communication** (4) I, II, III. Bell, Motley

Lecture—4 hours. Prerequisite: course 114 and 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. GE credit: SocSci.

**130. Group Communication Processes** (4) I. Vohs

Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes. GE credit: SocSci.

**134. Interpersonal Communication** (4) I. Berger; III. Motley

Lecture—4 hours. Prerequisite: course 1 or 3, or 10 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.

**135. Nonverbal Communication** (4) II. Berger  
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.

**136. Organizational Communication** (4) II. Vohs  
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.

**138. Communication and Cognition** (4) I. Berger

Seminar—4 hours. Prerequisite: upper division standing. Relationships 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. Offered in alternate years. GE credit: SocSci.

**140. Mass Communication and the Public** (4) I, III. Theobald

Lecture—4 hours. Current issues in mass communications policy, with emphasis on the broadcast media. Examination of the economic and legal influences on media performance; the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites. GE credit: SocSci.

**141. Mass Communication Theory and Research** (4) I, II, III. Theobald

Lecture—4 hours. Prerequisite: course 115, or the equivalent course in social science research methods. Recent developments in the study of mass communications content and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences: children, minorities, the aged. GE credit: SocSci.

**\*142A. News Policies and Practices in Television** (2) II. The Staff (Chairperson in charge)  
Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

**\*142B. News Policies and Practices in the Press** (2)

Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing, and reporting the news in the print media, as examined by a practicing professional.

**143. Media Criticism: Broadcast** (4) I, II. Theobald

Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture. GE credit: SocSci.

**145. Mass Communication and Social Change** (4) III. Alcalay

Lecture—4 hours. Prerequisite: course 115 or the equivalent. Study of communication campaigns as a way to effect social change. Effect on people's behaviors which occur via mass media and interpersonal communication channels. Focus on theory and practice of campaigns in such areas as health, intercultural and international communication. GE credit: SocSci.

**152. Theories of Persuasion** (4) I, II. Bell  
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.

**161. Cultural Perspectives on Health Communication** (4) III. Alcalay

Lecture—4 hours. Prerequisite: upper division standing. Study of various cultures through health communication campaigns and representative media and cultural products (e.g., literary artifacts, films). Exploration of health promotion campaigns as manifestations of cultural values and beliefs about sexuality, human relations, religion, morality, illness, and health.

**\*180. Current Topics in Communication** (4) II, III. The Staff

Seminar—4 hours. Prerequisite: upper division standing with a major in Communication or consent of instructor. Groups study of a special topic in communication. May be repeated once for credit. Enrollment limited.

**\*190X. Upper Division Seminar** (1-4) I, II, III. The Staff (Chairperson in charge)

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 Communication. Emphasis upon student participation in learning. May not be repeated for credit. Limited enrollment.

**192. Internship in Communication** (1-6) I, II, III. The Staff

Internship—3-18 hours. Prerequisite: declared major in Communication and 20 units of upper division Communication courses. Work-research projects, usually at off-campus sites, under departmental supervision. May be repeated for credit up to 12 units. Units do not count toward major requirements. (P/NP grading only.)

**\*194H. Senior Honors Thesis** (4) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

Seniors may take graduate courses with consent of instructor.

**\*213. Theory Development in Communication Inquiry** (4) I. Berger

Seminar—4 hours. This course explores meta-theoretical approaches to developing social-scientific theories of human communication. Perspectives include covering-laws, systems, rules, axiomatic theory construction, causal modeling, scientific realism and grounded theory. Research design and measurement implications of these perspectives are examined.

**\*214. Mass Communication Theory and Research** (4) I. Alcalay

Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the basic theories, models, and assumptions of mass communication. Reviews the current state of this discipline and major research developments. Special emphasis on research regard-



ing media and violence, women and minorities, political communication, and new technologies.

**\*215. Mass Communication and Social Change** (4) I. Alcalay

Seminar—4 hours. Prerequisite: courses 220 and 214, or the equivalent. To gain an understanding of current theories and concepts in persuasion and mass communication. To explore how principles of persuasion are used in communication campaigns. To acquire skills in the planning, implementation, and evaluation of campaigns. Offered in alternate years.

**\*220. Empirical Methods in Communication** (4) I. Motley

Lecture—4 hours. Prerequisite: course 115 or consent of instructor. Introduction to the use of experimental and descriptive research methods in communication research. Topics include survey research, interviewing, experimental and quasi-experimental design, and statistics.

**\*240. Advocacy in Contemporary Society** (4) III. The Staff

Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocative stance. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in alternate years.

**\*242. Proseminar in Symbolic Behavior** (4) I. Motley

Seminar—4 hours. Prerequisite: course 220. Examination of language and/or other symbolic codes in communication. Investigated phenomena may include stylistic variation, speech arts, cognitive processing, communication rules, and audience effects. Offered in alternate years.

**\*243. Persuasion Theory** (4) I. Bell

Lecture/seminar—4 hours. Prerequisite: course 152 or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion theories.

**\*244. Organizational Communication** (4) III. Vohs

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

**\*246. Perspectives on Relational Communication** (4) II. The Staff

Seminar—4 hours. Prerequisite: course 212. Critical survey of the current state of inquiry on communication in personal relationships, i.e., friendship, romantic, and marital relationships. Issues examined include the role of communication in constructing, maintaining, and dissolving relationships.

**\*248. Media Criticism** (4)

Seminar—4 hours. Prerequisite: a course in criticism. Examines broadcast, print, and visual media by means of rhetorical, psychological, semiological, sociological, and cultural studies and perspectives. Comparison of media and of critical theory scope in understanding media messages. Offered in alternate years.

**\*249. Interpersonal Communication Theory** (4) I. Bell

Lecture/seminar—4 hours. Prerequisite: course 134 or consent of instructor. Major theories of interpersonal communication and related research.

**\*251. Special Topics in Interpersonal Communication** (4) III. Berger

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit when topic differs.

**\*252. Special Topics in Mass Communication** (4) III. Alcalay

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in mass communication theory and research. May be repeated for credit when topic differs.

**\*253. Negotiation** (4) Vohs

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiating. Offered in alternate years.

**\*260. Communication Applications** (2-4) I, II, III. The Staff (Chairperson in charge)

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 once for credit. (S/U grading only.)

**\*298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours.

**\*299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**\*299R. Thesis Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Independent study—3-36 hours. Prerequisite: graduate standing in Communication. (S/U grading only.)

**Professional Course**

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Community Health**

See **Epidemiology and Preventive Medicine; and Family and Community Medicine, under Medicine, School of**

**Community and Regional Development**

(College of Agricultural and Environmental Sciences) **Faculty.** See the Department of Human and Community Development.

**The Major Program**

The Community and Regional Development major (formerly Applied Behavioral Sciences) is concerned with the study of communities and the people in them. The program focuses on community and organizational development, the role of culture and ethnicity in shaping community life, and the ways that knowledge can be used to solve social problems and improve the quality of 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. In addition, the major includes a student-designed field of concentration to complement the student's academic and career interests. Examples of recently approved areas of concentration are organizational planning and management, aging and community development, health care in ethnic communities, community design and planning, socio-environmental planning, and community education.

**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 community health. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences.

**B.S. Major Requirements:**

|                                                                                                                                                                                                                                                                                                 |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                                                 | UNITS        |
| <b>English Composition Requirement</b> .....                                                                                                                                                                                                                                                    | <b>4-12</b>  |
| See College requirement .....                                                                                                                                                                                                                                                                   | 0-8          |
| Additional English (English 101, 104A, 104B, 104C, 104D, or 104E) .....                                                                                                                                                                                                                         | 4            |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                         | <b>22-25</b> |
| Community Development (Community and Regional Development 1) .....                                                                                                                                                                                                                              | 4            |
| Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 15) .....                                                                                                                                                                                             | 3-4          |
| Economic theory (Economics 1A or 1B).....                                                                                                                                                                                                                                                       | 5            |
| Ethnicity and American communities (Community and Regional Development 2).....                                                                                                                                                                                                                  | 4            |
| Social science theory (Anthropology 2 or Sociology 1).....                                                                                                                                                                                                                                      | 4-5          |
| Statistics (Statistics 13 or 32 or Sociology 46B) .....                                                                                                                                                                                                                                         | 3-4          |
| <b>Breadth/General Education Requirement</b> .....                                                                                                                                                                                                                                              | <b>24</b>    |
| Satisfaction of General Education requirement.                                                                                                                                                                                                                                                  |              |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                               | <b>40</b>    |
| Community and Regional Development 151, 151L, 160, or 168 .....                                                                                                                                                                                                                                 | 4            |
| Community and Regional Development 142, 152, or 154 .....                                                                                                                                                                                                                                       | 4            |
| Two courses from Community and Regional Development 157, 158, 164, or 171.....                                                                                                                                                                                                                  | 8            |
| Two courses from Community and Regional Development 140, 141, 156, or 162.....                                                                                                                                                                                                                  | 8            |
| Community and Regional Development 172 or 176 .....                                                                                                                                                                                                                                             | 4            |
| Two courses from Community and Regional Development 118, 173, 175 or International Agricultural Development 103.....                                                                                                                                                                            | 8            |
| Internship: Community and Regional Development 192 .....                                                                                                                                                                                                                                        | 4            |
| <b>Areas of Specialization</b>                                                                                                                                                                                                                                                                  |              |
| 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). |              |
| <b>Community Groups Option</b> .....                                                                                                                                                                                                                                                            | <b>40</b>    |
| Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.                                                                                                                                                                          |              |
| <i>General</i> (Community and Regional Development 157, 172, 176, American Studies 156, Human Development 103)                                                                                                                                                                                  |              |
| <i>African Americans</i> (African American and African Studies 100, 123, 130, 145A, Sociology 128, 129, 130, 134)                                                                                                                                                                               |              |
| <i>Asian Americans</i> (Asian American Studies 100, 110, 111, 112, 155)                                                                                                                                                                                                                         |              |
| <i>Chicanas/os</i> (Chicana/o Studies 100, 110, 111, 120, 121, 131, 132, 140, Political Science 168)                                                                                                                                                                                            |              |
| <i>Native Americans</i> (Native American Studies 115, 116, 117, 118, 122, 130A/B, 134, 156, 181B)                                                                                                                                                                                               |              |
| <i>Youth</i> (American Studies 152, Human Development 100A, 100B, 101, 102, 103, 130, 131, 140, 140L, 141, 142, 151, Psychology 112, Sociology 122, 152)                                                                                                                                        |              |
| <i>Aging</i> (Community and International Health 180, Human Development 100C, 143, 160, 162, 191, Sociology 154)                                                                                                                                                                                |              |
| <i>Gender</i> (American Studies 154, Anthropology 130, Political Science 166, Psychology 114, Sociology 132, 133, 145B, Women's Studies 103, 130, 140, 187)                                                                                                                                     |              |

*Specially Challenged Individuals* (Education 115, Exercise Science 131, Human Development 130, 131)  
*Class* (Sociology 140, 185)

**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, Agricultural Economics 100A, 171A, Computer Science Engineering 167, Economics 104, 105, 115A, Political Science 100, 105, 142, 155, 181, 182, 183)

*Communication* (Communication 114, 130, 134, 136, 140, 152, Community and Regional Development 173, 175, Education 120, 163)

*Human Resources* (Community and Regional Development 172, 176, Economics 151B, Food Service Management 123, Psychology 143, 144, 145, 183, Sociology 120, 128, 129)

*Management* (Community and Regional Development 118, 140, 141, 154, 161, 162, 164, Agricultural Economics 112, 113, History 174A, Political Science 188, Sociology 138, 139, 158, 159, 180A, 180B)

**Policy and Planning 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, 154, 162, Environmental Science and Policy 165, Political Science 100, 103, 105, 108, 109, 142, 173, 183)

*Environmental Policy* (Political Science 107, 175, Environmental Science and Policy 110, 160, 161, 164, 166, 168A, 168B, 171, 172, 173, 179, Environmental and Resources Sciences 121)

*Law and Policy* (Sociology 120, 152, 155, Political Science 103, 105, 154, 155, 181, 182)

*Urban and Regional Planning* (Community and Regional Development 140, 141, 152, 157, 158, 159, 171, Economics 115A, Environmental Planning and Management 110, 134, Environmental Science and Policy 171, 173, Geography 155, Political Science 100, 101, 102)

**Social Services Option .....40**

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

*Community Health* (Community and Regional Development 164, Community Health 101, Environmental Science and Policy 126, Psychology 160, Sociology 154)

*Aging* (Community Health 180, Human Development 100C, 143, 160, 162)

*Counseling* (Communication 134, 135, Education 160, 163, Human Development 121, 130, Psychology 143, 145, 168)

*Youth* (American Studies 152, Human Development 100A, 100B, 101, 102, 103, 130, 131, 140, 140L, 141, 142, 151, Psychology 112, Sociology 122, 152)

*The Family* (Human Development 110, 131, 135, Sociology 134, 135)

*Education* (Community and Regional Development 173, 175, Agricultural Education 100, 160, 163, Education 100, 110, 114, 120, Psychology 136, Sociology 124)

*Bilingual Education* (Education 151, 152, 153, Psychology 132)

**Unrestricted Electives .....39-50**  
**Total Units for the Degree .....180**

**Major Adviser.** M. Kenney

**Advising Center** for the major is located in 1303 Hart Hall (530) 752-2244.

**Minor Program Requirements:**

The Community and Regional Development faculty offers the following minor program:

UNITS

**Community Development .....24**  
 Community and Regional Development 1, 151, 152, 164 .....16

Two courses selected from the following:  
 Community and Regional Development 140, 157, 158, 162, 168, 171, 172, 173, 175, 176 .....8

**Minor Adviser.** M. Kenney.

**Graduate Study.** Refer to the Graduate Studies chapter of this catalog.

**Related Courses.** See Environmental Science and Policy 10, 101, 133.

**Courses in Community and Regional Development (CRD)**

(Formerly courses in Applied Behavioral Sciences.)

**Lower Division Courses**

**1. The Community** (4) I. Tarallo; III. The Staff  
 Lecture—4 hours. 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.

**2. Ethnicity and American Communities** (4) II. Guarnizo; III. The Staff  
 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.

**\*17. Population and Community** (2) I. The Staff  
 Lecture—2 hours. Dynamics and challenges offered by demographic changes in California and the world community. Implications for individuals and communities. Special emphasis on the possible contributions each individual can make towards resolving global problems related to human ecology through local community action. (P/NP grading only.)

**47. Orientation to Community Resources** (2) II. Fujimoto; III. The Staff  
 Field work—40 hours (4-day field trip); seminar—three 2-hour sessions. (Course given between quarters.) Intensive field course in either San Francisco or the California Central Valley. Students interact with agencies and individuals who address the range of human service, educational and social needs in the city. Advance reservations required. (P/NP grading only.)

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
 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) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 (P/NP grading only.)

**Upper Division Courses**

**118. Technology and Society** (4) I. Kenney  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technol-

ogy on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment. GE credit: SocSci, Wrt.

**140. Dynamics of Regional Development** (4) II. Kenney

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.

**141. Organization of Economic Space** (4) II. Momsen

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.

**142. Rural Change in the Industrialized World** (4) III. Momsen

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.

**151. Community Field Research: Theory and Analysis** (3) II. The Staff; III. Smith

Lecture—3 hours. Prerequisite: course 151L must be taken concurrently; course 1 and any upper division Community and Regional Development course are recommended. Design and analysis of research at the community level with a focus on the relationship between practice and theory. Focus will be on conducting community research using structural analysis, elite interviewing, ethnographic research, and other such research methods. GE credit: SocSci, Div, Wrt.

**151L. Laboratory in Community Research and Analysis: Field Experience** (1-3) II. The Staff; III. Smith

Fieldwork—3-9 hours. Prerequisite: course 151 concurrently. Field research focused on community or organizational issues and their resolution. Includes assignment with local agencies or community-based organizations. The focus will be conducting community research using such methods as structural analysis, elite interviewing, ethnographic research, and comparative community studies.

**152. Community Development** (4) III. Bradshaw  
 Lecture—4 hours. Prerequisite: course 1 or 151, Sociology 2, Anthropology 2, Asian American Studies 100, Chicano Studies 132, Geography 5, or African American Studies 101. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities. GE credit: SocSci, Wrt.

**\*153. International Community Development** (4) III. Fujimoto

Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of global forces on community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development.

**154. Social Theory and Community Change** (4) II. Hirtz

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.

**156. Community Economic Development** (4) III. Bradshaw

Lecture—4 hours. Prerequisite: course 1 or a lower division course in Sociology, Political Science, or Economics; course 152 recommended. How government and community organizations help firms grow and

create jobs through local economic development corporations, small business centers, revolving loan funds, incubators, and many other programs. Techniques to analyze community economic potential and identification of appropriate intervention tools.

**157. Politics and Community Development (4) II.** Smith

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.

**\*158. Small Community Governance (4) II.** Sokolow

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.

**160. Research Design and Method in Community Studies (4) I.** Goldman

Lecture—4 hours. Prerequisite: course 1; Statistics 13 or the equivalent. Application of behavioral science research methodology to multidisciplinary problems confronting communities and community organizations. Focuses on design, sampling, measurement and analysis.

**161. Ethnographic Research in America (4) III.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology, Sociology, or Community and Regional Development. Methodologies, ethics and goals of qualitative research. Emphasis on analyzing and conducting ethnographic research in American communities; problem formulation, analytic modes, data correction and interpretation. Offered in alternate years.

**162. People, Work and Technology (4) I.** Wells  
Lecture—4 hours. Prerequisite: course work in the social sciences (e.g., Sociology 1, 3, Anthropology 137, Economics 1A, 1B) or labor history. 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.

**\*163. Behavior of Community Organizations (4) I.** The Staff

Lecture—4 hours. Prerequisite: introductory social sciences course. How community organizations function and how members of organizations interact with each other, the organization, and those people who are clients of the organization. Effects of leadership, motivation, group dynamics, communications, and power.

**164. Theories in Organizational Change (4) II.** The Staff

Lecture—4 hours. Prerequisite: course 1 or 2. Development of approaches to planned change including normative re-educative, applied systems, and developmental strategies.

**168. Program Evaluation and the Management of Organizations (4) III.** Goldman  
Lecture—4 hours. Prerequisite: courses 160, 161. Role of program evaluation in organizational and program management. Impact of internal evaluation in program planning, improvement, and accountability.

**171. Housing and Social Policy (4) II.** The Staff  
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.

**172. Social Inequality: Issues and Innovations (4) III.** Wells  
Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combina-

tion. 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.

**173. The Continuing Learner (4) I.** The Staff  
Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.

**\*174. Communication for Community Change (4) I.** The Staff  
Lecture—4 hours. Prerequisite: course 1. Communication as a mechanism and method for creating change in communities. Theories and practices; impact of message on attitudes and behavior; ethics of change induced through communication. Offered in alternate years.

**\*175. Education in the Community (4) I.** The Staff  
Lecture—4 hours. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Function of education in the community. Relationships of community and non-formal education to formal education, schooling and to individual, community and national development. Planning process and role of education in social and community change. Offered in alternate years.

**176. Comparative Ethnicity (4) I.** Guarnizo  
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.

**\*190. Current Issues in Applied Behavioral Sciences (1) I, II, III.** The Staff  
Seminar—1 hour. Current social, political, and economic issues affecting communities and individuals. One-hour presentations by guest speakers on research topics and contemporary issues in Community Development. (P/NP grading only.)

**192. Internship (1-12) I, II, III.** The Staff (Chairperson in charge)  
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) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**240. Community Development Theory (4) I.** Bradshaw  
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.

**241. The Economics of Community Development (4) II.** Kenney  
Lecture—4 hours. Prerequisite: course 240. 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.

**242. Community Development: Program Management (4) III.** Hirtz  
Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

**\*244. The Political Economy of Domestic Development (4) III.** Kenney  
Lecture—4 hours. Prerequisite: course 241. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and change are examined with specific reference to case study material.

**\*245. The Political Economy of Urban and Regional Development (4) II.** Smith  
Lecture—4 hours. Prerequisite: course 157, 244, or the equivalent. How global politics 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.

**246. The Political Economy of Transnational Migration (4) II.** Guarnizo  
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.

**247. Transformation of Work (4) I.** Wells  
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.

**290. Seminar (1) I.** Wright and staff; II, III. Wright  
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)

**292. Graduate Internship (1-12) I, II, III.** Staff  
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.)

**298. Group Study (1-5) II.** Guarnizo

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)  
(S/U grading only.)

**Professional Course**

**440. Professional Skills for Community Development (4) III.** The Staff  
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.

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## Community Development (A Graduate Group)

Michael P. Smith, Ph.D., Chairperson of the Group  
Group Office, 1303 Hart Hall (Human and Community Development; 530-752-1926)

**Faculty.** The interdisciplinary faculty includes a core group of faculty from the Community and Regional Development unit of Human and Community Development, as well as a broad group of faculty from Agricultural and Resource Economics, American Studies, Communication, Environmental Science and Policy, Environmental Design/Landscape Architecture, the Graduate School of Management, Political Science, and Sociology. The graduate faculty also includes members from the campus Ethnic Studies programs, Education, Environmental Horticulture, Psychology, Statistics, Textiles and Clothing, Vegetable Crops, and from University Extension.



**Graduate Study.** The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program prepares students for professional roles as administrators, designers, planners, or researchers, with emphasis upon urban and rural communities and human service organizations. Graduate study in community development also prepares individuals to work within government or non-profit organizations in the realm of social and economic change. Students have the opportunity to specialize in (1) urban and rural development, (2) community economic development, (3) community design and planning, (4) ethnic and cultural diversity, (5) gender and community development, (6) community health and human services, and (7) environmental planning.

**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, cultural geography, or political science, and courses in community studies.

**Graduate Advisers.** Contact the Group Office.

## Community Nutrition

(College of Agricultural and Environmental Sciences)

### The Major Program

Community nutrition teaches students the identification of nutrition-related health problems and the biological, behavioral, economic, and sociocultural factors that influence the nutrition of individuals and groups. The aim of community nutrition is to apply this knowledge to the development of programs that improve the nutritional status in the community.

**The Program.** The community nutrition major is for students who seek to combine a foundation in the biological and nutritional sciences with study in the social sciences. All students in the major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the adviser.

**Career Alternatives.** The community nutrition major prepares students for jobs in administrative, teaching, research, or public health/public service positions or for graduate or professional training in nutrition and other health sciences. Students who complete the academic requirements for an internship in dietetics are also qualified for careers in dietetics, following completion of an internship.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

|                                                                                                     |              |
|-----------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                        | <b>0-8</b>   |
| See College requirement                                                                             |              |
| <b>Preparatory Subject Matter</b> .....                                                             | <b>49-51</b> |
| Biological sciences (Biological Sciences 1A, 1B, 1C) .....                                          | 15           |
| Chemistry (Chemistry 2A, 2B, 8A, 8B) .....                                                          | 16           |
| Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 15) ..... | 3-4          |
| Cultural food habits (Nutrition 20) .....                                                           | 4            |
| Cultural social science (Anthropology 2, Geography 2, or Sociology 3) .....                         | 4            |
| Social research methods (Sociology 46A or Psychology 41) .....                                      | 4            |
| Statistics (Sociology 46B or Statistics 13) .....                                                   | 4            |
| <b>Breadth/General Education</b> .....                                                              | <b>6-24</b>  |

Satisfaction of General Education requirement .....6-24  
(Note that some of the Option Subject Matter may meet General Education requirements.)

**Depth Subject Matter** .....

|                                                              |    |
|--------------------------------------------------------------|----|
| Animal Biology 102 and 103 .....                             | 8  |
| Food Science and Technology 100A, 100B, 101A, 101B .....     | 10 |
| Nutrition 111, 112, 116A, 116B, 118, 120A or 120B, 190 ..... | 22 |
| Nutrition 192 .....                                          | 2  |
| Neurobiology, Physiology and Behavior 101, 101L .....        | 7  |

**Option Subject Matter** .....

|                                                                                                                                                         |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>28-32</b>                                                                                                                                            |       |
| Course work chosen from one of the three options below in consultation with adviser .....                                                               | 18-20 |
| Additional units in a related social or health science chosen in consultation with adviser .....                                                        | 10-12 |
| (May include a minor program in fields such as physical education, environmental toxicology, community development, statistics or the social sciences.) |       |

**Behavioral-Psychological Option**

|                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Psychology 1, Education 110 or Psychology 130                                                                                                                                                                          |
| Psychology 112 or Human Development 100A or 100B                                                                                                                                                                       |
| Psychology 115 or Human Development 100C                                                                                                                                                                               |
| Psychology 108, 129, 145, 165, 168, 180A, 180B, 180C; Anthropology 129, 130; Communication 115; Community and Regional Development 173, 178; Consumer Science 100; Food Science and Technology 107, 117; Sociology 154 |

**Economics and International Development Option**

|                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agricultural and Resource Economics 100A, 100B, 120, 130, 141; Anthropology 122, 126; Communication 115; Consumer Science 100; Economics 1A, 1B, 100, 101, 115A, 115B, 118, 123, 130, 151A, 162; Environmental Science and Policy 1, 165; International Agricultural Development 10, 103, 110, 111, 195; Mathematics 16A; Sociology 170 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Sociocultural Option**

|                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Foreign language (10 units or the equivalent strongly recommended)                                                                                     |
| African American and African Studies 100; Anthropology 101, 126, 133, 135; Communication 115; Community and Regional Development 2; Geography 170, 175 |
| Regional courses, choose 8 units from one of the following four areas (alternative courses may be selected in consultation with the adviser)           |

*North America:*

|                                                                  |
|------------------------------------------------------------------|
| Anthropology 141A, 176, History 169A, 169B, Sociology 143A, 143B |
|------------------------------------------------------------------|

*Central and South America:*

|                                                                                 |
|---------------------------------------------------------------------------------|
| Geography 122A, 122B, History 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168 |
|---------------------------------------------------------------------------------|

*Africa:*

|                                                                         |
|-------------------------------------------------------------------------|
| Anthropology 140A, 140B, Geography 125A, 125B, History 115A, 115B, 115C |
|-------------------------------------------------------------------------|

*Asia:*

|                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------|
| Anthropology 142, 147, 148, 149, Geography 124, History 137A, 137B, 137C, 138, 190A, 190B, 190C, 191A, 191B, 193, 194A, 194B, 194C, 195 |
|-----------------------------------------------------------------------------------------------------------------------------------------|

**Additional Recommended Courses.** Community and Regional Development 151, 152, Community Health 101, 160, 180, 194, Environmental Science and Policy 126, Nutrition 114, 116AL, 116BL, 117, 129, 130, 199, 219A, 219B, Sociology 106.

**Unrestricted Electives** .....

|                              |     |
|------------------------------|-----|
| <b>16-48</b>                 |     |
| Total Units for Degree ..... | 180 |

\*Course not offered this academic year.

**Major Adviser.** R.B. McDonald (*Nutrition*).

**Advising Center** for the major is located in 1202E Meyer Hall (530-752-2512).

**Dietetics Internship.** To fulfill the academic requirements for an internship in Dietetics, the following courses must be included: Economics 1B, Agricultural and Resource Economics 112, Food Service Management 120, 120L, 122, Communication 1, Community and Regional Development 173 or Education 110, Food Science and Technology 108, Psychology 1, Nutrition 116AL-116BL. Consult the Advising Center prior to the first quarter of the junior year for information on procedures.

**Graduate Study.** For information on graduate study, see the Graduate Studies chapter of this catalog.

## Comparative Literature

(College of Letters and Science)

Kari Lokke, Ph.D., Program Director

Program Office, 522 Sproul Hall (530-752-9934)

World Wide Web:

### Committee in Charge

Marc E. Blanchard, Agrégé de Lettres (*Comparative Literature, French*)

Patricia Bulman, Ph.D. (*Comparative Literature*)

Gail Finney, Ph.D. (*Comparative Literature, German*)

Manfred Kusch, Ph.D. (*Comparative Literature, French*)

Kari Lokke, Ph.D. (*Comparative Literature, English*)

Harriet Murav, Ph.D. (*Comparative Literature, Russian*)

Seth L. Schein, Ph.D. (*Comparative Literature*)

Juliana Schiesari, Ph.D. (*Comparative Literature, Italian*)

Robert M. Torrance, Ph.D. (*Comparative Literature*)

### Faculty

Salvatore Allosso, Ph.D., Lecturer

Marc Eli Blanchard, Agrégé de Lettres, Professor (*Comparative Literature, French*)

Patricia Bulman, Ph.D., Lecturer

Gail Finney, Ph.D., Professor (*Comparative Literature, German*)

Manfred Kusch, Ph.D., Senior Lecturer (*Comparative Literature, French*)

Kari Lokke, Ph.D., Associate Professor (*Comparative Literature, English*)

Scott McLean, Ph.D., Lecturer

Harriet Murav, Ph.D., Associate Professor (*Comparative Literature, Russian*)

Donna Reed, Ph.D., Lecturer

Seth L. Schein, Ph.D., Professor

Juliana Schiesari, Ph.D., Professor (*Italian, Comparative Literature*)

Brenda Schildgen, Ph.D., Lecturer

Robert M. Torrance, Ph.D., Professor

### Emeriti Faculty

Ruby Cohn, Ph.D., Professor Emerita

Roland W. Hoermann, Ph.D., Professor Emeritus

### The Major Program

Comparative literature encourages students to read, think about, and compare books from different national languages and from different parts of the world. Comparative literature enlarges students' horizons by bridging the divisions between national cultures instead of concentrating on a single tradition.

**The Program.** Both the major and 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, "Great Books of Western Culture" and "Major Books of the Contemporary World," provides both an overview of European literary culture



from ancient times to the present and intensive practice in analytical thought and English composition. 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.** Careers directly related to comparative literature include teaching, journalism, publishing, and translating. Because many professional schools consider a literature major an excellent background for their graduate disciplines, comparative literature provides valuable preparation (supplemented with courses outside the major) for careers in business, government, medicine, or law.

## A.B. Major Requirements:

|                                                                                                                                                                                                                                                   | UNITS        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                           | <b>15-46</b> |
| Comparative Literature 1, 2, 3.....                                                                                                                                                                                                               | 12           |
| One lower division course other than Comparative Literature 1, 2, 3, and 10A-N.....                                                                                                                                                               | 3-4          |
| Foreign language: sufficient preparation to insure satisfactory performance at the upper division level.....                                                                                                                                      | 0-30         |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                 | <b>40</b>    |
| Five upper division courses (including at least three in a language other than English) distributed between the first and second literatures of concentration with the approval of the adviser.....                                               | 20           |
| Comparative Literature 141.....                                                                                                                                                                                                                   | 4            |
| Two additional upper division Comparative Literature courses, including at least one in a major literary period (such as 164A, 161B, 161C, 161D), genre (such as 160A-160B, 161A-161B, or 166A-161B), or movement (such as 168A-168B or 169)..... | 8            |
| Two additional upper division courses in one or both literatures of concentration or in Comparative Literature, selected with the approval of the adviser.....                                                                                    | 8            |
| <b>Total Units for the Major</b> .....                                                                                                                                                                                                            | <b>55-82</b> |

### Recommended

Anthropology 2; Classics 10; English 171A, 171B; French 114; History 4A-4B-4C, 101; Linguistics 1, 4, 163; Philosophy 24, 123; Religious Studies 2.

**Major Adviser.** The Staff.

## Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

|                                                                                                                                  | UNITS     |
|----------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Comparative Literature</b> .....                                                                                              | <b>24</b> |
| Comparative Literature 1, 2, 3, or 4.....                                                                                        | 4         |
| At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended).....                | 8         |
| Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature..... | 12        |
| Courses should form a coherent program and 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.** Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. 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. Only students who have attained a cumulative GPA of 3.5 in all courses satisfying the major (except elementary foreign language courses) at the

end of the junior year will be eligible for the honors program.

**Teaching Credential Subject Representative.** The Staff. See also the Teacher Education Program.

**Graduate Study.** Refer to Comparative Literature (A Graduate Group). See also the Graduate Studies chapter of this catalog.

## Courses in Comparative Literature (COM)

### Lower Division Courses

**1. Great Books of Western Culture: The Ancient World** (4) I, II, III. Director in Charge  
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from *The Epic of Gilgamesh* to St. Augustine's *Confessions*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**2. Great Books of Western Culture: From the Middle Ages to the Enlightenment** (4) I, II, III.  
Director in charge  
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante's *Inferno* to Swift's *Gulliver's Travels*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**3. Great Books of Western Culture: The Modern Crisis** (4) I, II, III. Director in charge  
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Goethe's *Faust* to Beckett's *Waiting for Godot*. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**4. Major Books of the Contemporary World** (4) I, II, III. The Staff  
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).

**5. Fairy Tales, Fables, and Parables** (4) I, II, III. Reed, Schildgen and staff  
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.

**6. Myths and Legends** (4) I. McLean  
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.

**7. Literature of Fantasy and the Supernatural** (4) II, III. Reed, Allosso  
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.

**8. Utopias and their Transformations** (4) I. Schein  
Lecture/discussion—3 hours; term paper. Prerequisite: English A. 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.

**9. The Short Story and Novella** (4) III. Bulman  
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.

**10A-N. Master Authors in World Literature** (2) I, II, III. The Staff (Director in charge)  
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, Turgenyev, Galdós, Ibsen; **(K)** Balzac, Dostoevski/Tolstol, 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.)

**\*12. Introduction to Women Writers** (4) The Staff  
Lecture/discussion—3 hours; term paper. 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. Students will practice literary analysis of voice, imagery, narrative strategies and diction. GE credit: ArtHum, Div, Wrt.

**\*13. Dramatic Literature** (3) III. The Staff  
Lecture—3 hours. Prerequisite: Subject A 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.

**\*14. Introduction to Poetry** (3) III. The Staff  
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.

**\*15. The Spiritual Quest** (3) I. The Staff  
Lecture/discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in such works as the *Bhagavad Gita*, *The Quest of the Holy Grail*, Dante's *Purgatory*, and Melville's *Moby Dick*. GE credit: ArtHum, Wrt.

**20. Man and the Natural World** (4) II. McLean  
Lecture/discussion—3 hours; term paper. Examination of the changing relationship between the individual human being and his "natural" environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, and Thoreau. GE credit: ArtHum, Wrt.

**\*25. Ethnic Minority Writers in World Literature** (4) The Staff  
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.

**\*53A. Literature of China and Japan (3)**

The Staff

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*, Tang 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)**

III. Schildgen

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.

**90X. Lower Division Seminar (1-2) I, II, III.**

The Staff

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) I, II, III.** The Staff (Director in charge)

(P/NP grading only.)

**Upper Division Courses**

**\*120. Writing Nature: 1750 to the Present (4) I.**

The Staff

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.

**135. Women Writers (4) II.** Reed

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.

**138. Gender and Interpretation (4) III.** Schiesari

Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the representation of gender roles and gender hierarchy in literary texts from various periods, societies, and cultures in light of research and theory on gender, with attention to gender as a topic for literary interpretation. GE credit: ArtHum, Div, Wrt.

**139. Shakespeare and the Classical World (4)**

III. Schein

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.

**\*140. Thematic and Structural Study of Literature (4) II.** The Staff

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.

**141. Literary Theory and Criticism (4) I.**

Torrance

Lecture/discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. GE credit: ArtHum, Wrt.

**\*142. Critical Reading and Analysis (4)**

The Staff (Director in charge)

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) III.** Lokke

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.

**145. Representations of the City (4) II.** Finney

Lecture/discussion—3 hours; term paper. Examination of the portrayal of the modern city in 19th and 20th century western literature. Readings include works by Balzac, Dickens, Poe, Baudelaire, Dostoevsky, Whitman, Zola, T.S. Eliot, and William Carlos Williams. GE credit: ArtHum, Wrt.

**\*146. Myth in Literature (4) II.** The Staff

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.

**147. Modern Jewish Writers (4) III.** The Staff

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.

**\*151. Colonial and Postcolonial Experience in Literature (4) III.** The Staff

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.

**\*152. Literature of the Americas (4) I.** The Staff

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.

**\*153. The Forms of Asian Literature (4)**

The Staff

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.

**\*154. African Literature (4)** The Staff

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.

**\*157. War and Peace in Literature (4)** The Staff

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.

**\*158. The Detective Story as Literature (4)**

The Staff

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.

**\*159. Women in Literature (4)** The Staff

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) II.** Torrance

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.

**\*160B. The Modern Drama (4)** The Staff

Lecture/discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: ArtHum, Wrt.

**161A. Tragedy (4) III.** Bulman

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)** The Staff

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) I.** Kuhn

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.

**164A. The Middle Ages (4) I.** Schildgen

Lecture/discussion—3 hours; term paper. Readings in heroic epics, chivalric romances, and such major authors as Dante and Chaucer, with emphasis on shared assumptions concerning man's place in the world. GE credit: ArtHum, Wrt.

**164B. The Renaissance (4) II.** Torrance

Lecture/discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular emphasis on changing conceptions of the possibilities and limitations of man. GE credit: ArtHum, Wrt.

**\*164C. Baroque and Neoclassicism (4)**

The Staff

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) III.** Kusch

Lecture/discussion—3 hours; term paper. Readings in major authors such as Swift, Voltaire, Rousseau, Sterne, and Kant, with emphasis on philosophical ideas and literary forms. GE credit: ArtHum, Wrt.

**166A. The Epic (4) I.** Schein

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.

**166B. The Novel (4) I.** Flavell

Lecture/discussion—3 hours; term paper. Readings in various forms of the novel such as the picaresque, the developmental, and the confessional, with emphasis on the evolution of the genre. May be repeated for credit in different subject area. GE credit: ArtHum, Wrt.

**\*167. Comparative Study of Major Authors (4)**

The Staff

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare,

Cervantes, Goethe, Tolstoj, Proust, and Joyce. GE credit: ArtHum, Wrt.

**168A. Romanticism** (4) III. McLean

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.

**\*168B. Realism and Naturalism** (4) The Staff

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.

**\*169. The Avant-Garde** (4) The Staff

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) The Staff

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) The Staff

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 once for credit when the topic differs. GE credit: ArtHum, Wrt.

**194H. Special Study for Honors Students** (1-5) I, II, III. The Staff (Director in charge)

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) II. Schiesari

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 once for credit when topic differs. Offered in alternate years.

**197T. Tutoring in Comparative Literature** (1-5) I, II, III. The Staff (Director in charge)

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) I, II, III. The Staff (Director in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)

(P/NP grading only.)

**Graduate Courses**

**210. Topics and Themes in Comparative Literature** (4) I, II, III. Schein, Torrance

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.

**214. Approaches to Lyric Poetry** (4) III. Schiesari

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.

**\*215. Forms of the Spiritual Quest** (4) The Staff 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) III. Murav

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.

**238. Gender and Interpretation** (4) II. Schein

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) I, II, III. The Staff (Director in charge)

Individual instruction—1 hour. Prerequisite: course 200. 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.

**250B. Research in Comparative Study of Author, Period, or Genre** (4) I, II, III. The Staff (Director in charge)

Individual instruction—1 hour. Prerequisite: courses 200 and 201. 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.

**250C. Basic Research for the Dissertation** (4) I, II, III. The Staff (Director in charge)

Individual instruction—1 hour. Prerequisite: courses 200 and 201. Individually guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

**\*255. Colloquium** (2) I, II, III. The Staff

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.)

**260. Contexts of the 19th-Century Novel** (4) I. Murav

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.

**298. Directed Group Study** (1-5) I, II, III. Prerequisite: graduate standing. (S/U grading only.)

**299. Individual Study** (1-12) I, II, III. The Staff (Director in charge)

(S/U grading only.)

**299D. Special Study for the Doctoral Dissertation** (1-12) I, II, III.

(S/U grading only.)

**Professional Courses**

**390. Teaching Comparative Literature in College** (3) I. Schildgen

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.)

**392. Teaching Internship in Comparative Literature** (1) I, II, III. Schildgen

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.)

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Comparative Literature (A Graduate Group)

Kari Lokke, Ph.D., Chairperson of the Group  
Group Office, 522 Sproul Hall (530-752-2239)

**Faculty.** The interdisciplinary faculty come from Comparative Literature, English, French, Italian, German, Russian, and Spanish.

**Graduate Study.** The Comparative Literature Program offers the M.A. and Ph.D. degrees with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the M.A. combine study of Comparative Literature with study of two literatures (one of which may be English or American) in the original languages. Ph.D. candidates, in addition to further 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. 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 Program, M.A. candidates should have an undergraduate major in literature and reading ability in one foreign language. Ph.D. candidates should have an undergraduate major in literature and reading ability in two 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.** S. Schein (*Comparative Literature*).

## Comparative Pathology (A Graduate Group)

Dennis W. Wilson, D.V.M., Ph.D., Chairperson of the Group

Group Office, 1042 Haring Hall (530-752-2657)

World Wide Web: <http://www.vetmed.ucdavis.edu/pmi/comppath/homecp.htm>

**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, i.e., D.V.M., M.D., D.D.S. Students without a professional degree will not be considered unless they have an especially strong background in basic biomedical sciences.

**Graduate Adviser.** J.G. Zinkl (*Pathology, Microbiology and Immunology*), D.H. Hinton (*Anatomy, Physiology and Cell Biology*), R.B. Le Febvre (*Pathology, Microbiology and Immunology*), K.M. Lam (*Population Health and Reproduction*), S.M. Stover (*Anatomy, Physiology, and Cell Biology*).

3. Have a UC Davis grade point average of 2.75 or better in the courses listed above. Students who have completed courses at another institution equivalent to those listed above must have a grade point average of 3.0 or better in the equivalent course work. All courses must be taken for a letter grade.

**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        |
| <b>Preparatory Subject Matter</b> .....                                         | <b>52-53</b> |
| Mathematics 21A-21B-21C, 22A-22B .....                                          | 18           |
| Statistics 32 .....                                                             | 3            |
| Computer Science Engineering 20, 40 .....                                       | 8            |
| Computer Science Engineering 30 or 35 .....                                     | 4            |
| Computer Science Engineering 50 or Electrical and Computer Engineering 70 ..... | 4            |
| One series from the following four .....                                        | 15-16        |
| (a) Chemistry 2A-2B-2C                                                          |              |
| (b) Chemistry 2A-2B and Biological Sciences 1A                                  |              |
| (c) Chemistry 2AH-2BH-2CH                                                       |              |
| (d) Physics 9A-9B-9C and Mathematics 21D                                        |              |

**Depth Subject Matter** .....

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>52-54</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |
| Computer science, Computer Science Engineering 110; 120 or 122B (completion of only 120 or 122B will satisfy the core requirement, but not a computer science elective simultaneously); 122A, 140A; 150 or 151A (completion of only 150 or 151A will satisfy the core requirement, but not a computer science elective simultaneously); 154A-154B .....                                                                                                                                                                                                                                                                                                                                                                       | 28    |
| Computer science electives .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 14    |
| Minimum of 14 units from Computer Science Engineering 120, 122B (completion of only 120 or 122B will satisfy the core requirement, but not a computer science elective simultaneously), 140B, 142, 150, 151A (completion of only 150 or 151A will satisfy the core requirement, but not a computer science elective simultaneously), 151B, 152A, 152B, 153, 158, 160, 163, 165A, 165B, 168, 170, 172, 175, 177, 178, 188, combined maximum of 3 units from approved 192 and 199 courses, Electrical and Computer Engineering 180A, 180B, Mathematics 160, 164 (completion of Mathematics 160 and/or 164 will satisfy either a computer science elective or a mathematics elective, but not both requirements simultaneously). |       |
| Mathematics electives .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10-12 |
| Mathematics 108; and one course from Mathematics 115A, 115B, 115C, 125, 127A, 127B, 127C, 131 (or Statistics 131A), 141, 145, 147, 149A, 149B, 150A, 150B, 150C; one upper division Mathematics course numbered below 188.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |

**Total Units for the Major** .....

**104-107**  
**Major Advisers.** M. Bishop, M. Gertz, N. Matloff, R. Olsson, P. Rogaway.

**Minor Program Requirements**

|                                                                                                                                                     |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                     | UNITS     |
| <b>Computer Science</b> .....                                                                                                                       | <b>24</b> |
| Computer Science Engineering 50 .....                                                                                                               | 4         |
| Computer Science Engineering 110 .....                                                                                                              | 4         |
| Upper division Computer Science Engineering courses .....                                                                                           | 16        |
| Select from Computer Science Engineering 120, 122A, 122B, 140A, 140B, 142, 150, 151A, 151B, 152A, 152B, 153, 154A, 154B, 158, 160, 163, 165A, 165B, |           |

168, 170, 172, 175, 177, 178, 189A-L, combined maximum of 3 units from approved 192 and 199 courses.

**Graduate Study.** See the Graduate Studies chapter of this catalog.

**Computer Science (A Graduate Group)**

Charles U. Martel, Ph.D., Chairperson of the Group  
 Group Office, 2063 Engineering II (Department of Computer Science)  
 (530-752-7004; gradinfo@cs.ucdavis.edu)  
 World Wide Web: <http://www.cs.ucdavis.edu>

**Faculty.** Consists primarily of faculty members from the Departments of Computer Science, Electrical and Computer Engineering, Applied Science (Livermore), Mathematics, and the Graduate School of Management.

**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, artificial intelligence, computer architecture, computer graphics, computer systems design, database systems, computer security, computer networks, fault tolerance, program specifications and verification, programming languages and compilers, parallel and distributed systems, operating systems, performance evaluation, robotics, 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 written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must pass preliminary written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

**Graduate Advisers.** N.S. Matloff, N. Max, R. Pandey.

**Conservation Biology**

**See Ecology (A Graduate Group); Environmental Biology and Management; and Wildlife, Fish, and Conservation Biology**

**Consumer Science**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Division of Textiles and Clothing.

**Major Programs.** The Consumer Food Science option under the Food Science major is a related program. See also Food Science and Technology, Nutrition, and Textiles and Clothing.

**Graduate Study.** For graduate study, see the Graduate Studies chapter of this catalog.

**Computer Science**

**See Computer Science; Computer Science (A Graduate Group); Engineering: Computer Science; and Engineering: Electrical and Computer Engineering**

**Computer Science**

(College of Letters and Science)

Biswanath Mukherjee, Ph.D., Chairperson of the Department

Ronald A. Olsson, Ph.D., Vice Chairperson of the Department

Department Office, 2063 Engineering II (530-752-7004)

World Wide Web: <http://www.cs.ucdavis.edu>

**Faculty.** For complete faculty listing, please see Engineering: Computer Science.

**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, and the formal mathematical tools required to use the computer in solving complex tasks. Emphasis in the major is on software, although introductory architecture is included. For students interested in the engineering aspects of computer science, see Engineering: Computer Science.

**Preparatory Requirements.** All continuing UC Davis students must meet the following requirements prior to requesting a change of major to computer science or double major with computer science:

1. Be a registered student at UC Davis at least one quarter prior to petitioning for change of major or double major.
2. Have completed the following courses or their equivalents:  
 Mathematics 21A, 21B, 21C, 22A . . . . . 15 units  
 Computer Science Engineering 20, 30, 40, and either 50 or Electrical and Computer Engineering 70 . . . . . 16 units

\*Course not offered this academic year.



## Courses in Consumer Science (CNS)

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising Office, 129 Everson Hall.

### Lower Division Courses

**92. Internship in Consumer Science** (1-12) I, II, III. Rucker  
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) II. Rucker  
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) I, II, III. Rucker  
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) I, II, III. Rucker (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. Rucker (P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III. Rucker (S/U grading only.)

### Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

which may be Critical Theory 201), and a special examination.

**Graduate Adviser.** Consult Critical Theory Program Office.

## Courses in Critical Theory (CRI)

### Graduate Courses

**200A. Approaches to Critical Theory** (4) I, II, III. The Staff (Director in charge)  
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).

**200B. Problems in Critical Theory** (4) I, II, III. The Staff (Director in charge)  
Seminar—3 hours; term paper. Prerequisite: course 200A with a grade of B+ or better. Focused study of a particular critical theoretical approach, school or perspective. Topics will vary. May be repeated for credit with consent of instructor when topic differs.

**200C. History of Criticism** (4) I. The Staff  
Seminar—3 hours; term paper. Critical analysis and discussion of pre-20th century theories of literary and cultural criticism. Topics will vary. May be repeated for credit with consent of instructor when topic differs.

**201. Critical Theory Special Topics** (4) I, II, III. The Staff (Director in charge)  
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.

**202. Visual Culture** (4) II. The Staff  
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.

**298. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Critical Theory

Marc E. Blanchard, Ph.D., Program Director  
(530-752-1038)

Program Office, 522 Sproul Hall (530-752-5464)

World Wide Web: <http://crittheory.ucdavis.edu/>

### Committee in Charge

Marc E. Blanchard, Agrégé de Lettres (*Comparative Literature, French*)

Elizabeth Constable, Ph.D. (*French*)

Joanne Diehl, Ph.D. (*English*)

Linda Egan, Ph.D. (*Spanish*)

M. Kay Flavell, Ph.D. (*Critical Theory*)

Smadar Lavie, Ph.D. (*Anthropology, Critical Theory*)

Janelle Reinelt, Ph.D. (*Dramatic Art*)

Irit Rogoff, Ph.D. (*Art, Critical Theory*)

Juliana Schiesari, Ph.D. (*Italian*)

**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, Dramatic Art, Education, English, French and Italian, German and Russian, History, Music, Philosophy, Psychology, Sociology, and Spanish). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (200A, 200B) offered by the program in Critical Theory, two additional graduate courses (one of

## Crop Science and Management

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Departments of Agronomy and Range Science; Agricultural and Resource Economics; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

**Related Major Programs.** The major relies on courses taught in conjunction with numerous other major programs, particularly Plant Biology, Agricultural Systems and Environment, and Agricultural and Resource Economics.

### The Major Program

The Crop Science and Management major trains students in biological and natural sciences and economics as they apply to the production, protection, and maintenance of crop plants, and their quality following harvest.

**The Program.** Students majoring in crop science and management spend the first two years of study developing the scientific and general background necessary for upper division work. The science courses include chemistry, biology, botany, physics, and mathematics. Management courses include economics and accounting. General background is provided by courses in the social sciences/humanities (English, rhetoric, and the general education program). At the

upper division level, students take courses in areas supportive of crop science and farm management, such as entomology, weed science, water and soil science, plant pathology, nematology, plant physiology and agricultural economics. Students may specialize by electing courses pertinent to specific crop types (vegetables, fruits and nuts, small grains, or nursery crops).

**Internships and Career Alternatives.** This program prepares graduates for careers in farm management and various other technical and management positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as private, state and federal service in consulting and research. Graduates are also qualified to pursue graduate studies in sciences such as plant biology, horticulture, agronomy, agroecology, pest management, economics or business management. Internships are available in local companies involved in farm production and in extension work with farm advisers.

### B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Courses shown without parentheses are required.)

**English Composition Requirement** .....8  
See College Requirement

**Preparatory Subject Matter** .....62-64  
Biological Sciences (Biological Sciences 1A, 1B, 1C) .....15  
Chemistry (Chemistry 2A, 2B, 8A, 8B) .....16  
Calculus (Mathematics 16A, 16B) .....6  
Physics (Physics 1A-1B or 7A-7B) .....6-8  
Computer science (Agricultural Systems and Environment 21) .....3  
Economics (Economics 1A, 1B) .....10  
Statistics (Agricultural Systems and Environment 120, Statistics 13 or 102) .....4  
Field equipment operations (Applied Biological Technology 49) .....2

**Breadth/General Education** .....24  
See General Education Requirement and consult your adviser

**Depth Subject Matter** .....61-63  
Crop and Soil Science Component .....22-24  
Plant Biology 111 or Environmental Horticulture 102; Plant Biology 142; Soil Science 100; Hydrologic Science 110 or 124 .....14-16

In consultation with adviser select a minimum of 8 additional units from Agricultural Systems and Environment 110A, 110B, 110C, 110L, Environmental Horticulture 125, Plant Biology 173, 174, Viticulture and Enology 115, 116 .....8

Pest Management Component .....16  
Entomology 110, Nematology 100, Plant Biology 176, Plant Pathology 120

Economics and Business Management Component .....23  
Agricultural and Resource Economics 100A, 130, 140, Management 100 .....16

In consultation with adviser select a minimum of 7 additional units from Agricultural and Resource Economics 100B, 112, 120, 145, 147M, 150 or 157 .....7

**Restricted Electives** .....12  
In consultation with adviser select a minimum of 12 units from the following:

Agricultural Systems and Environment 101, 105, 107, 112, 118, 120, 121, 122, 150, 170A, 170B, 192, 194H, 195, Applied Biological Technology 52, 134, Entomology 119, 119L, 135, Environmental Horticulture 102, 105, 120, 125, 130, Plant Biology 111L, 112, 117, 121, 146, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 175, 177, 196, Plant Pathology

125, Soil Science 109, Viticulture and Enology 101A, 101B, 101C, 110, 111, 118.

**Unrestricted Electives** .....9-13  
(Internship and Spanish Recommended)

**Total Units for the Major** .....180

**Major Adviser.** T. DeJong.

**Advising Center** for the major is located in 152 Hunt Hall (530-752-1715).

**Related Courses.** See under Departments of Agronomy and Range Science, Agricultural and Resource Economics, Plant Biology, Plant Pathology, and Viticulture and Enology.

## Courses in Crop Science and Management (CSM)

### Lower Division Courses

**92. Internship in Crop Science and Management** (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship in crop production, research or management. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**192. Internship in Crop Science and Management** (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship off or on campus in crop production, research or management; or in a business, industry, or agency associated with these or other crop science enterprises. (P/NP grading only.)

**194H. Special Study for Honors Students** (1-5) I, II, III. The Staff (Master Adviser in charge) Independent study—3-15 hours. Prerequisite: senior standing, Crop Science and Management major, overall GPA of 3.25 or higher, and consent of Master Adviser. Two or three successive quarters of guided research on crop science and management related subject of special interest to the student. (P/NP grading only; deferred grading only, pending completion of thesis.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

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## Dermatology

See Medicine, School of

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## Design

(College of Agricultural and Environmental Sciences)  
JoAnn Stabb, M.A., Chairperson, Design Program  
Department Office, 142 Walker Hall (530-752-6223)

### Faculty

Richard Berteaux, B.Arch., M.S., Associate Professor  
Dolph Gotelli, M.A., Professor  
Patricia Harrison, M.Arch., Associate Professor  
Gyöngy Laky, M.A., Professor  
Helge B. Olsen, Senior Lecturer  
Susan Palmer, M.A., Lecturer  
Kathleen L. Plummer, M.F.A., Lecturer  
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor  
Barbara Shawcroft, M.F.A., Professor  
Kathryn Sylva, M.F.A., Assistant Professor  
JoAnn C. Stabb, M.A., Senior Lecturer

### Emeriti Faculty

Frances Butler, M.A., Professor Emerita  
Katherine W. Rossbach, M.A., Professor Emerita

## The Major Program

The design program offers a creative, challenging, and flexible approach to the study of design. The philosophy of the program encourages self-direction and independent thinking, not only in design work but also in planning the overall undergraduate education.

**The Program.** Foundation courses, Design and Visual Culture; Design, Creativity and Fantasy; Design Drawing; Design Media; and Visual Use of Computers in Design, are required of all design majors. Beyond these, students take courses in their depth subject matter emphasizing their interests. Students select one of three areas of emphasis to focus undergraduate study: *Textile and Costume Design*, *Interior Architecture*, and *Visual Communication and Presentation*. These areas can also be combined into a fourth area of emphasis, *Comprehensive Design*, through an individualized study plan developed with a faculty adviser. The selected emphasis determines the required core of courses; all emphases are strongly complemented by classes in related design history. A more detailed explanation is available through the Design Advising Center, 152 Walker Hall.

**Portfolio.** Students are required to keep a continuing portfolio of their creative work to be evaluated by faculty for the purposes of declaring the major, enrolling in overflow courses, and requesting independent study, internship, or other similar courses. Incoming first-year and transfer students with a strong background in art or design are encouraged to submit a portfolio to waive some of the preparatory studio courses.

**Internships and Career Alternatives.** As part of their preparation, design students are encouraged to supplement their education with internships in design firms, museums, art galleries, textile galleries, and in interior designers' and architects' offices. Design graduates go directly from this program into further graduate study, clothing and interior design and architectural firms, exhibit and 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.

## B.S. Major Requirements:

|                                                                                                                                  | UNITS        |
|----------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                                                     | <b>4-12</b>  |
| See College requirement .....                                                                                                    | 0-8          |
| Additional English (English 101, 102, 104A, 104B, 104C, 104D, or 104E).....                                                      | 3-4          |
| <b>Preparatory Subject Matter</b> .....                                                                                          | <b>20</b>    |
| Select one course from Art History 1A, 1B, 1C or 1D .....                                                                        | 4            |
| Design 1, 14, 15, 16 .....                                                                                                       | 16           |
| <b>Breadth/General Education</b> .....                                                                                           | <b>32</b>    |
| Sixteen units in natural science and 16 units in social sciences (to include satisfaction of General Education requirement)..... | 32           |
| <b>Depth Subject Matter</b> .....                                                                                                | <b>56-57</b> |
| Design 100 .....                                                                                                                 | 4            |
| Design history, select from Design 140, 142A, 142B, 143, 144 .....                                                               | 12           |
| Select one area of specialization (option) below .....                                                                           | 40-41        |
| <b>Interior Architecture</b> option.....                                                                                         | <b>41</b>    |
| Architectural drawing, Design 21 .....                                                                                           | 4            |
| Materials and specifications, Design 138 ...                                                                                     | 2            |
| Fundamentals of interior architecture, Design 134A-134B-134C .....                                                               | 12           |
| Advanced interior architecture, Design 180A-180B .....                                                                           | 8            |
| Senior project, Design 180C .....                                                                                                | 4            |
| Senior project preparation and documentation, Design 193A-193B .....                                                             | 3            |
| Two courses from Design 121, 135A, 135B, 136, 150 .....                                                                          | 8            |

\*Course not offered this academic year.

**Textile and Costume Design** option .....

Lower division courses selected with adviser approval from Design 18, 23, 24, 77A, 77B .....

Upper division courses selected with adviser approval from Design 124, 125, 131, 132A, 132B, 132C, 160A, 160B, 170A, 170B, 177 .....

**Visual Communication and Presentation** option .....

Three courses from Design 13, 18, 21, 22 .....

**Comprehensive Design** option .....

Three-dimensional design, Design 18 .....

**Restricted Electives** .....

Two courses from American Studies 1A, Anthropology 2, Communication 1, 3, Geology 1, Psychology 1, Sociology 1, 25 .....

Courses selected from the list of Restricted Electives with approval of adviser.....

**Unrestricted Electives** .....

**Total Units for the Degree**.....

**Additional Requirement**

Development of a course of study, in consultation with an adviser, upon completion of 90 units or prior to transferring into the major.

**Major Adviser.** R. Berteaux.

**Graduate Study.** The graduate program in Textile Arts and Costume 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 textile and costume design. Study in new technologies and experimental approaches are encouraged. Areas of emphasis include constructed textiles (off loom and woven), surface design, computer-integrated textile design, and functional, ethnographic, and aesthetic costumes. The Textile and Costume Study Collection, which houses over 8,500 artifacts, is a valuable resource in enriching studies emphasizing multi-cultural expression. For information about specific requirements, please contact the Advising Center at 530-752-1165.

**Graduate Adviser.** Please contact department at 530-752-6223.

## Courses in Design (DES)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (530-752-1165).

### Lower Division Courses

**1. Design and Visual Culture** (4) I. Shawcroft  
Lecture—4 hours. Introduction to design awareness; role of designer in contemporary culture; emphasis on visual literacy and perception, creative problem solving, and design vocabulary. GE credit: ArtHum, Wrt.

**13. Photographic Media Studio (4) I, II, III.** Sylva in charge

Studio—8 hours. Prerequisite: course 1; course 3 concurrently; priority enrollment to Design majors. Film and videotape for description, simulation, analytical research, and design development.

**14. Design Drawing (4) I.** Laky, Wagner

Studio—8 hours. Priority given to Design majors. Students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Develop freehand drawing skills to graphically communicate ideas and form. Basic skills in objective observation and representation. Color as a transition from value. Range of media used. Not open for credit to students who have taken course 11.

**15. Design Media (4) II.** Palmer and staff

Lecture—2 hours; studio—4 hours. Priority given to Design majors. Understand color, composition and form as ways of communicating design concepts and content. Media and photography as tools for all design students: color theory and mixing, variety of materials and media, introduction to the camera. Not open for credit to students who have taken course 12.

**16. Visual Use of Computers in Design (4) I.**

Sylva in charge

Lecture—2 hours; studio—6 hours. Prerequisite: courses 14, 15. Introduction to the computer as a visual design tool. Use of the Macintosh platform and exploration of specific software used in design. Practical instruction combined with theoretical perspective to investigate the impact of visual computing on the design process.

**18. Three-Dimensional Design (4) I.** Shawcroft

Studio—8 hours. Principles of three-dimensional design through creative experimentation in a variety of media. Exploration of structural, perceptual, and spatial properties of form.

**21. Drafting and Perspective (4) I.** Olsen in charge

Studio—8 hours. Prerequisite: course in drawing recommended. Creation of three-dimensional designs on two-dimensional surfaces.

**22. Visual Communication: Image and Type (4) II.** Sylva

Studio—8 hours. Prerequisite: courses 13, 14, 15, 16 or consent of instructor. Priority given to Design majors. Presentation of the fundamentals of design. Specific focus will be on gestalt principles of design, balance and visual hierarchy; integration of text and image on the two-dimensional page; and introduction to typographic exploration using Macintosh platform.

**\*23. Personal Adornment (4) I.** The Staff (Stabb in charge)

Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relation to the human structure.

**24. Hand Constructed Textiles (4) I.** Laky

Studio—8 hours; one or two field trips. Prerequisite: courses 14, 15. Contemporary approach to textile techniques of construction such as netting, plaiting, knotting and basketry.

**77A. Soft Product Development (4) II.** The Staff

Studio—8 hours. Prerequisite: courses 14, 15 recommended. Basic theories and principles of soft product development from two-dimensional shapes to three-dimensional forms. Approaches include flat pattern, draping, as well as processes of joining and building. Structural development of clothing in relation to bodies is emphasized.

**77B. Soft Product Development (4) III.** The Staff  
Studio—8 hours. Prerequisite: course 77A. Study and practice of designing clothing for the human body through pattern development and structural joining sequences. Problems emphasize advanced theories and principles of soft product development.

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Stabb in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

## Upper Division Courses

**100. Design, Creativity, and Fantasy (4) III.**

Gotelli

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. To explore and develop personal creativity and imagination utilizing fantasy as a methodology for design. Examples of fantasy as found in the designed environment. Use of fantasy as problem solving tool in design. (Former course 3.) GE credit: ArtHum, Wrt.

**121. Design Delineation (4) III.** Olsen in charge  
Studio—8 hours; field trip. Prerequisite: courses 14, 15, and 21. Exploration of the process of delineation, including principles of perspective drawing, rapid visualization techniques (the quick sketch), rendering, and graphic presentation methods.

**124. Textile Structures (4) III.** Laky  
Studio—8 hours; field trip. Prerequisite: course 24. Art and science of hand building structures in flexible materials. Studio projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

**125. Textiles in the Landscape (4) III.** Shawcroft  
Studio—8 hours. Prerequisite: courses 24 and 124 or consent of instructor. Structuring organic and mathematical forms in textiles, working with the symbiotic relationship of these textiles and their immediate placement in the outdoor landscape.

**126A. Visual Presentation: Visual Merchandising (4) II.** The Staff

Studio—8 hours; field trips. Prerequisite: courses 14, 15 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on visual merchandising.

**126B. Visual Presentation: Exhibition Design (4) I.** Gotelli

Studio—8 hours; field trips. Prerequisite: course 14, 15 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

**126C. Visual Presentation: Installation and Design (4) III.** Gotelli

Studio—8 hours; field trips. Prerequisite: course 126A and 126B or consent of instructor. Advanced principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on self-expression and alternative exhibition spaces.

**131. Layered Textiles and Costumes (4) III.**

Rivers

Studio—8 hours; field trip required. Prerequisite: courses 14, 15, 23, and 24 recommended. Exploration of surface embellishments and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of handmade textiles/costumes and individual expression. Topics included mola and applique, piecing and quilting, beadwork, embroidery, and dimensional surfaces. Offered in alternate years.

**132A. Loom-Constructed Textile Design (4) I.**

The Staff

Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations.

**132B. Loom-Constructed Textile Design (4) II.**

The Staff

Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

**132C. Computer-Aided Textile Design (4) III.**

The Staff

Studio—8 hours. Prerequisite: course 132B. Micro-computer applications to the structure, design, and weaving of fabrics, emphasizing advanced composi-

tions, drafting, and plotting of multi-dimensional, original weave structures.

**134A. Introduction to Interior Architecture (4) I.** Olsen

Studio—8 hours; required field trips. Prerequisite: courses 14, 15, 21 and upper division standing. The design process through simple space planning problems focused on residential and small commercial spaces.

**134B. Introduction to Interior Architecture (4)**

II. Berteaux

Studio—8 hours; required field trips. Prerequisite: course 134A. Problems in interior architecture emphasizing environmentally conscious design concepts and issues. Includes thermal comfort, issues in sustainable design, reduction of waste, "green materials," and resource recycling.

**134C. Introduction to Interior Architecture (4)**

III. Harrison

Studio—8 hours; required field trips. Prerequisite: course 134B. Focus on technical environments such as laboratories, medical facilities, child care facilities, school facilities, computer installations. Includes instruction in model making and presentations in the form of models or photographic presentations derived from computer modeling.

**135A. Furniture Design (4) II.** Olsen

Studio—8 hours; required field trip. Prerequisite: course 21; course 134A recommended. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models.

**135B. Furniture Design (4) III.** Olsen in charge

Studio—8 hours; required field trip. Prerequisite: course 135A 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. Process includes development of shop drawings and furniture construction.

**136. Recording Historic Structures (4) III.**

Berteaux

Studio—8 hours; field trip required. Prerequisite: courses 14, 15, and 21 or the equivalent. A studio course of individual and group projects that introduces students to historic preservation. A major component of the course is on-site study of a historic building and the production of measured drawings.

**138. Materials and Specifications for Interior Architecture (2) I.** Harrison

Lecture—2 hours; Field trips required. Prerequisite: course 21; course 134A recommended. Introduction to construction and finish materials used in interior architecture. Supplementary course for studio courses 134A, 134B, 134C and 180A, 180B, 180C.

**140. History of Design (4) II.** The Staff (Stabb in charge)

Lecture—4 hours. Prerequisite: Art History 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology, consumer goods, hand workmanship, and industrial design. GE credit: ArtHum, Wrt.

**142A. World Textiles: Far East and Pacific (4) I.**

Rivers

Lecture—4 hours, field trip. Prerequisite: courses 132A, 132B, 160A, or 170A (concurrently) highly recommended: course 1, Art History 1A, 1B, or 1C also recommended. Textile arts of Japan, China, Africa, India, Oceania, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of textiles from these cultures. GE credit: ArtHum, Wrt.

**142B. World Textiles: Middle East, Europe and the Americas (4) III.** The Staff

Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended: course 24, 124, 131, 132A, 132B, 160A-160B-160C or 170A-170B-170C (concurrently). Study of concepts and methods significant in the historical, social, esthetic



and stylistic development of the textile arts. GE credit: ArtHum, Wrt.

**143. History of Costume Design (4) II.** Stabb  
Lecture—4 hours; field trip. Prerequisite: Art History 1A or the equivalent; background in art or design history recommended. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects. GE credit: ArtHum, Wrt.

**144. History of Interior Design (4) III.** Plummer  
Lecture—4 hours. Prerequisite: course 140 and Art 1C or the equivalent. 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. GE credit: ArtHum, Wrt.

**150. Computer-Assisted Drawing for Designers (4) II, III.** The Staff  
Studio—8 hours. Prerequisite: courses 21, 121. Computer-assisted drafting for interior architecture and design.

**152A. Visual Communication: Graphic Design Production (4) I.** Sylva in charge  
Studio—8 hours. Prerequisite: course 22 or consent of instructor. Priority given to Design majors. Focus on the understanding of symbolism and representation as essential components to the development of effective logos and identity systems. Emphasis on the need to incorporate these design strategies within the context of computer-generated prepress limitations. Not open for credit to students who have taken course 25.

**152B. Visual Communication: Message Campaign Design (4) II.** Sylva in charge  
Studio—8 hours. Prerequisite: course 152A or consent of instructor. Priority given to Design majors. By analyzing and utilizing strategies used in advertising, this class explores the power of visual media to change public opinion on issues of social concern and human rights. Visual designs will be created on Macintosh platforms. Not open for credit to students who have taken course 133A.

**153. Visual Communication: Internet and Interactive Design (4) III.** Sylva  
Studio—8 hours. Prerequisite: course 22 or consent of instructor; course 152B highly recommended. Priority given to Design majors. Introduction to computer-based interactive design for World Wide Web, Intranet systems, CD-ROM, or kiosks. Emphasis in development of strategies for content development; visual cohesiveness between content and interface design; and graphic production techniques using Macintosh platform. Not open for credit to students who have taken course 133B.

**160A. Textile Design: Patterning and Resists (4) II.** Rivers  
Studio—8 hours; required field trip. Prerequisite: courses 1, 14, 15 or the equivalent. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, dyeing and patterning of hand-printed textiles; emphasis on the unique qualities of the individual producer. Techniques include tie-dye, direct dyeing (with fiber-reactive dyes and indigo) and batik resists.

**160B. Textile Design: Screen Printing and Advanced Technique (4) III.** Rivers  
Studio—8 hours; required field trip. Prerequisite: course 160A. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, dyeing and patterning of hand-printed textiles; emphasis on the unique quality of the individual producer. Techniques include silk screen printing, photo silkscreen, and advanced dyeing processes.

**170A. Costume Design (4) I.** Stabb  
Studio—8 hours; required field trip. Prerequisite: courses 1, 14, 15, 77B (or the equivalent); course 142A taken concurrently recommended. Open to Design and Textiles and Clothing majors. Exploration of costume design as an expression of contemporary and projected individual image. Emphasis on one-of-a-kind garments in relationship to surface design and archetypal forms.

**170B. Apparel Design (4) III.** Stabb  
Studio—8 hours; required field trip. Prerequisite: courses 77B, 170A. Exploration of apparel design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas utilizing commercial textiles for ready-to-wear.

**\*177. Apparel Design for Consumer Cultures (4) III.** The Staff  
Studio—8 hours. Prerequisite: course 170B. Principles and processes of designing apparel for various user groups. The relationship among clothing, the body, and the environment is addressed in meeting functional and aesthetic concerns.

**180A. Advanced Interior Architecture (4) I.** Berteaux  
Studio—8 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing buildings. Focus is on commercial and retail environments, code requirements, color and lighting.

**180B. Advanced Interior Architecture (4) II.** Harrison  
Studio—8 hours; field trip. Prerequisite: course 180A. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments.

**180C. Senior Project in Interior Architecture (4) III.** Berteaux  
Studio—8 hours. Prerequisite: course 180B, 193A; course 193B concurrently. A comprehensive design project defined and carried out individually by each student as a senior project, working from a detailed program developed winter quarter of a subject in interior architecture of special interest to the student.

**\*190. Proseminar (1) II, III.**  
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) I, II, III.** The Staff (Stabb in charge)  
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.

**192. Internship (1-6) I, II, III** summer. The Staff (Stabb in charge)  
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 summer session. (P/NP grading only.)

**193A. Research for Senior Project in Interior Architecture (2) II.** Berteaux  
Lecture/discussion—2 hours. Prerequisite: course 180A; course 180B concurrently. Problem-focused research for senior students in interior architecture. Selection and research of a topic for a senior project in course 180C and the development of a preliminary program for the selected project. (P/NP grading only.)

**193B. Senior Project Documentation (1) III.** Berteaux  
Lecture/discussion—1 hour. Prerequisite: course 193A, 180B; course 180C concurrently. Revision and completion of research begun in course 193A and the documentation of the completed senior project in course 180C. Documentation to be done on the computer and produced in tabloid-sized booklet. (P/NP grading only.)

**197T. Tutoring in Design (1-5) I, II, III.** The Staff (Stabb in charge)  
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) I, II, III.** The Staff (Stabb in charge)  
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study of Advanced Undergraduates (1-5) I, II, III.** The Staff (Stabb in charge)  
(P/NP grading only.)

## Graduate Courses

**221. Experimental Approaches to Textile and Costume Design Media and Methods (4) I.** The Staff  
Lecture/discussion—2 hours; seminar—1 hour; term paper required. Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Covers perspectives on theoretical and aesthetic issues such as methodology in historical, contemporary and ethnographic fiber/fabric media. Students apply theories to their creative explorations for presentation and discussion.

**\*222. Seminar in Costume and Textile Design Criticism (4) II.** The Staff  
Seminar—2 hours; discussion—1 hour; variable—1 hour. Prerequisite: course 221, graduate standing in Textile Arts and Costume Design or consent of instructor. An open forum which addresses criticism and communication in relation to creative work in textile arts and costume design through seminar, readings, field trips and discussion.

**224. Seminar in Textile and Costume Design Research (4) I, II, III.** The Staff  
Lecture—4 hours; discussion—1 hour. Prerequisite: course 222; to be taken concurrently with course 142A (fall), 142B (spring) or 143 (winter) with separate discussion section; graduate standing in Textile Arts and Costume Design or consent of instructor. Required of first-year students. Students utilize existing historical and ethnographic materials as a point of departure for creative work through research and examination of textile/costume specimens with oral and written presentation of findings. May be repeated for credit.

**290. Seminar in Design (4) II, III.** The Staff  
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit.

**292. Practicum in Textile Arts/Costume Design (1-12) I, II, III.** The Staff  
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) I, II, III.** The Staff  
Studio. Prerequisite: consent of instructor. (S/U grading only.)

**299. Individual Focused Study (1-12) III.** The Staff  
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) I, II, III.** The Staff  
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. May be repeated for credit. (S/U grading only.)

## Professional Course

**396. Teaching Assistant Training Practicum (1-4) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)



## Dietetics

(College of Agricultural and Environmental Sciences)

### The Major Program

The Dietetics 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 Dietetics major takes 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. Dietetics 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 Pre-calculus Qualifying Examination with a minimum score of 27, or have taken calculus at a community college or other four-year institution.

**Career Alternatives.** The Dietetics major qualifies students to apply for the American Dietetics Association "accredited internship," 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 dietetics are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

|                                                                                                           | UNITS        |
|-----------------------------------------------------------------------------------------------------------|--------------|
| <b>Written/Oral Expression</b> .....                                                                      | <b>8</b>     |
| Written expression (English 1 or 3) .....                                                                 | 4            |
| Oral expression (Communication 1).....                                                                    | 4            |
| (Above courses simultaneously satisfy College requirement.)                                               |              |
| <b>Preparatory Subject Matter</b> .....                                                                   | <b>56-58</b> |
| Biological sciences (Biological Sciences 1A, 1B).....                                                     | 10           |
| Chemistry (Chemistry 2A, 2B, 8A, 8B).....                                                                 | 16           |
| Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 10 or 15) ..... | 3-4          |
| Economic principles (Economics 1A or 1B).....                                                             | 5            |
| Microbiology (Microbiology 102, 102L or Food Science and Technology 104, 140L).....                       | 6            |
| Psychology (Psychology 1).....                                                                            | 4            |
| Social science theory (Sociology 1 or 3 or Anthropology 2).....                                           | 4-5          |
| Statistics (Statistics 13) .....                                                                          | 4            |
| <b>Breadth/General Education</b> .....                                                                    | <b>6-24</b>  |
| Satisfaction of General Education requirement                                                             |              |
| <b>Depth Subject Matter</b> .....                                                                         | <b>68</b>    |
| Agricultural and Resource Economics 112...4                                                               |              |

|                                                                      |              |
|----------------------------------------------------------------------|--------------|
| Community and Regional Development 173 or Education 110 .....        | 4            |
| Biological chemistry and Nutrition (Animal Biology 102 and 103)..... | 8            |
| Food Science and Technology 100A, 100B, 101A, 101B, 108 .....        | 13           |
| Food Service Management 120, 120L, 122 .....                         | 8            |
| Nutrition 111, 112, 116A, 116AL, 116B 116BL, 118, 190.....           | 24           |
| Physiology (Neurobiology, Physiology and Behavior 101, 101L).....    | 7            |
| <b>Unrestricted Electives</b> .....                                  | <b>22-42</b> |
| Total Units for the Major.....                                       | 180          |

**Major Adviser.** A.J. Clifford (*Nutrition*).

**Advising Center** for the major is located in 1202E Meyer Hall (530-752-2512).

**Graduate Study.** See the Graduate Studies chapter of this catalog.

## Dramatic Art

### Programs in Dance

(College of Letters and Science)

Janelle Reinelt, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (530-752-0888)

#### Faculty

Sarah Pia Anderson, Professor  
Bobbie J. Bolden, M.A., Lecturer (*Dramatic Art, African American and African Studies*)  
Sue Ellen Case, Ph.D., Professor  
Susan Foster, Ph.D., Professor  
Phyllis J. Kress, M.A., Lecturer  
Janelle Reinelt, Ph.D., Professor  
Barbara Sellers-Young, Ph.D., Associate Professor  
Karen Shimakawa, Ph.D., Assistant Professor (*Dramatic Art, Asian American Studies*)  
Darrell F. Winn, M.A., Lecturer  
William B. Worthen, Ph.D., Professor (*Dramatic Art, English*)

#### Emeriti Faculty

Ruby Cohn, Ph.D., Professor Emerita  
Harry C. Johnson, M.A., Professor Emeritus  
William E. Kleb, D.F.A., Professor Emeritus  
Robert K. Sarlós, Ph.D., Professor Emeritus  
Daniel E. Snyder, Professor Emeritus  
Alan A. Stambusky, Ph.D., Professor Emeritus

### The 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 and provides a strong foundation in all aspects of drama, theater, and dance performance and production. While this is not a pre-professional program with a high degree of specialization, students can build significant skills in specific areas as well as achieving the broad goals of the degree.

**Productions and Facilities.** Productions each year are separated into two "seasons." The University Theatre Season usually consists of five or six major productions of established plays and dance productions. The Studio Season consists of smaller productions of new student-written plays and established plays. Also included in the production program are occasional major presentations of an experimental works and many class-related projects.

**Career Alternatives.** The program enables students to pursue a variety of opportunities after graduation, including graduate education, public sector arts employment, advanced professional training programs, and, in some cases, professional work.

### A.B. Major Requirements:

|                                                                                                                                                                                                                           | UNITS     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                   | <b>26</b> |
| Dramatic Art 20, 24, 25, 26 .....                                                                                                                                                                                         | 14        |
| Dramatic Art 21A or 14.....                                                                                                                                                                                               | 4         |
| Additional units to achieve a total of 26 lower division units chosen from Dramatic Art 21B, 40A, 40B, 41A, 41B, 98, 99, African American and African Studies 51 or courses in other departments with adviser's approval. |           |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                         | <b>40</b> |
| Dramatic Art 127A, 156A, 156B, 156C .....                                                                                                                                                                                 | 16        |
| Dramatic Art 127B, 160A .....                                                                                                                                                                                             | 4         |
| Two courses chosen from Dramatic Art 124B, 124C, 124D .....                                                                                                                                                               | 8         |
| Two courses chosen from Dramatic Art 150, 153, 154, 155, 159 .....                                                                                                                                                        | 8         |
| A minimum of 4 elective units chosen from the following: Dramatic Art 121A, 121B, 122A, 122B, 124A, 124B, 124C, 124D, 125, 127B, 130, 140A, 140B, 143, 170, or courses in other departments with adviser's approval ..... | 4         |
| <b>Additional Requirements</b> .....                                                                                                                                                                                      | <b>14</b> |

During the undergraduate career, majors are to participate in University Theatre Season and Studio productions. Participation must include work in three of the following four areas: acting/dance, design, studio (scenic, costume, lighting, painting, props, sound), directing/ playwriting/stage management. In addition, majors are expected to serve on a running crew a minimum of one quarter per academic year. Majors are also expected to attend theatre performances.

Total Units for the Major.....80

**Major Adviser.**

### Minor Program Requirements:

|                                           | UNITS     |
|-------------------------------------------|-----------|
| <b>Dramatic Art</b> .....                 | <b>20</b> |
| Dramatic Art 156A, 156B, 156C.....        | 12        |
| One of Dramatic Art 124B, 124C, 124D..... | 4         |
| (Plus prerequisites)                      |           |
| <b>Additional Requirements</b> .....      | <b>4</b>  |

During the undergraduate career, minors are to participate in University Theatre Season and Studio productions. Participation must include work in two of the four areas required by the major. Minors are expected to attend theatre performances.

**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/play writing/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.

**Guest Artists.** The Granada Visiting Artists Program brings distinguished professional British directors to the campus each year, teaching and directing in residence for a quarter. These working professional artists take the role of professor, interacting closely with students in the classroom and rehearsal halls and providing 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. (acting) and Ph.D. (performance and culture) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

**Graduate Adviser.** W.B. Worthen.

## Courses in Dramatic Art (DRA)

### Lower Division Courses

#### 1. Theatre, Performance and Culture (4) I, II, III. The Staff

Lecture/discussion—4 hours. Introductory investigation of the nature of all performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, dance, sports, political rallies and demonstrations, religious celebrations, civic pageants and "occasions." Investigation of the border between ritual and performance. GE credit: ArtHum, Div, Wrt.

**10. Introduction to Acting (3) I, II, III.** The Staff  
Laboratory/discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of the theatre productions. Intended for students not specializing in Dramatic Art.

**14. Introduction to Contemporary Dance (2) I, II, III.** Bolden  
Laboratory/discussion—4 hours. Introduction to basic movement skills used in contemporary dance. Focus on holistically preparing the body for dance. Basic techniques and terminology used in ballet, modern or jazz dance and short combinations emphasizing use of space, quality, and rhythm.

**20. Introduction to Dramatic Art (4) I, III.** The Staff  
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.

**21A. Fundamentals of Acting (4) II.** The Staff  
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 the theatre productions. Limited to those planning to major in Dramatic Art.

**21B. Fundamentals of Acting (4) III.** The Staff  
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.

**24. Visual Aspects of Dramatic Art (4) I.** The Staff  
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) III.** The Staff  
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) I.** Winn  
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.

**30. Theatre Laboratory (1-5) I, II, III.** The Staff  
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 a total of 8 units.

**40A. Beginning Modern Dance (2) I.** Bolden  
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 once for credit with consent of instructor.

**40B. Intermediate Modern Dance (2) II.** Bolden  
Laboratory/discussion—4 hours. Prerequisite: course 40A. Modern dance techniques. Basic anatomy, dance terminology, and a general overview of modern dance history.

**41A. Beginning Jazz Dance (2) II.** Bolden  
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 once for credit with consent of instructor.

**41B. Intermediate Jazz Dance (2) III.** Bolden  
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 once for credit with consent of instructor.

**42A. Beginning Ballet (2) III.** The Staff  
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 once for credit with consent of instructor.

**42B. Intermediate Ballet (2) I.** The Staff  
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 once for credit with consent of instructor.

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**\*115. Advanced Study of Major Film Makers (4) III.** The Staff  
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) I.** The Staff  
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. Offered in alternate years.

**\*121B. Advanced Acting: Comedy from Farce to Manners (4) II.** The Staff  
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. Offered in alternate years.

**122A. Advanced Acting: Realism (4) I.** The Staff  
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. Offered in alternate years.

**122B. Advanced Acting: Non-Realism (4) II.** The Staff  
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. Offered in alternate years.

**124A. Principles of Theatrical Design: Scenery (4) II.** The Staff  
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) III.** The Staff  
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) III.** Winn  
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

**124D. Principles of Theatrical Design: Costume (4) II.** Kress  
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.

**125. Scenic Painting: Studio (4) II.** The Staff  
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 once with consent of instructor. Offered in alternate years.

**127A. Principles of Directing (4) I.** Anderson  
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) II.** Anderson  
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.

**\*130. Approaches to Theatrical Design: Practice and Theory (4) II.** Hunt  
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.

**140A. Dance Composition I (3) II.** Bolden  
Lecture/laboratory—5 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.

**140B. Dance Composition II (3) III.** Bolden  
Lecture/laboratory—5 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.

**140C. Dance Composition III (3) I.** The Staff  
Lecture/laboratory—5 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.

**141. Introduction to the Fundamentals of Movement** (3) I. Sellers-Young

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.

**143. Dance and Movement Studio** (1-4) I, II, III. Bolden

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.

**145. Directed Choreography Projects** (4) II. The Staff

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.

**150. American Theatre and Drama** (4) II. The Staff

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.

**154. Asian Theatre and Drama: Contexts and Forms** (4) II. Sellers-Young

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.

**\*155. Representing Race in Performance** (4) III. The Staff

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 once 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) I. Bolden

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.

**156A. History of Theatre and Dance: Ancient to 1650** (4) I. Worthen

Lecture—4 hours. Overview of theatre and dance as it has come to be recognized in ancient societies through to 1650. Performance traditions studied include Greek, Indian, Aztec, Roman, Japanese (Noh), through the Renaissance. GE credit: ArtHum, Div, Wrt.

**156B. History of Theatre and Dance: 1650-1900** (4) III. Reinelt

Lecture—4 hours. Overview of theatre and dance between 1650 and 1900. Dance and theatre are related to the specific social and political organizations of court society in 17th and 18th century France, Germany and England, and to Japanese society. GE credit: ArtHum, Div, Wrt.

**156C. History of Theatre and Dance:**

**The Twentieth Century** (4) II. Shimakawa  
Lecture—4 hours. Overview of theatre and dance in the twentieth century. Although largely focused on Western theatrical practices, the relationship between East and West performance practices will be studied and contemporary Japanese theatre will be included. GE credit: ArtHum, Div, Wrt.

**159. Contemporary Experimental Theatre and Drama** (4) I. Case

Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events. May be repeated once with consent of instructor.

**160A-160B. Principles of Playwriting** (4-4) I-II. The Staff

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) I. The Staff  
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 once for credit.

**180. Theatre Laboratory** (1-5) I, II, III. The Staff  
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.

**192. Internship in Dramatic Art** (1-12) I, II, III.

The Staff (Chairperson in charge)  
Internship—3-36 hours. Prerequisite: upper division or graduate work in dramatic art; upper division course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling students to practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**194HA-194HB. Special Study for Honors Students** (3-3) I, II, III. The Staff

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) I, II, III.

The Staff (Chairperson in charge)  
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) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****\*200. Methods and Materials in Theatre Research** (4) I. The Staff

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** (2) I, II, III.

The Staff  
Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

**212. Advanced Stage Movement** (2) I, II, III.

Sellers-Young  
Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic

movement patterns relating to acting problems in classic and modern plays. May be repeated for credit.

**221. Special Problems in Advanced Acting** (4)

I, II, III. Granada Artist, The Staff  
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.

**\*228. Seminar in Directing Theory: Non-Realism** (4) III. Granada Artist

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. Offered in alternate years.

**\*229. Special Problems in Directing** (5) I, II, III.

The Staff and Granada Artist  
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.

**\*250. Modern Theatre** (4) II. The Staff

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.

**259. Topics in Contemporary Theatre and Performance** (4) I. Cohn

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.

**\*265A. Theory of Dramatic Art: Modes of Production** (4) II. The Staff

Seminar—3 hours; term paper. Introduces students to literature of theatrical practice, cultural and aesthetic theory, as related to practical stage performance. Offered in alternate years.

**265B. Theory of Dramatic Art: Signification and the Body** (4) III. Reinelt

Seminar—3 hours; term paper. Introduce students to analysis of the body in performance, drawing on theoretical models from various fields. Offered in alternate years.

**265C. Theory of Dramatic Art: Technologies of Difference** (4) I. The Staff

Seminar—3 hours; term paper. Introduce students to history, theory, practice of staging social and cultural difference. Offered in alternate years.

**\*265D. Theory of Dramatic Art** (4) II. The Staff  
Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in alternate years. (Former course 265.)

**280. Theatre Laboratory** (1-12) I, II, III. The Staff  
Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

**299. Individual Study** (1-12) I, II, III, The Staff (Chairperson in charge)

(S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)



**Professional Course**

**413. Stage Make-up (1) II.** The Staff  
Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

## Earth Sciences

**See Hydrologic Sciences (A Graduate Group); Hydrology; Environmental and Resource Sciences; Soil and Water Science; and Soil Science**

## East Asian Languages and Cultures

(College of Letters and Science)  
———, Ph.D., Chairperson of the Department  
Department Office, 522 Sproul Hall (530-752-4995)

**Faculty**

- Robert Borgen, Ph.D., Professor (*Japanese, History*)
- Chia-ning Chang, Ph.D., Associate Professor (*Japanese*)
- Kyu Hyun Kim, Ph.D., Assistant Professor (*Japanese, History*)
- Whalen Lai, Ph.D., Professor (*Chinese, Religious Studies*)
- Sophie Volpp, Ph.D., Assistant Professor (*Chinese*)
- Michelle Yeh, Ph.D., Professor (*Chinese*)

**Emeriti Faculty**

- Donald A. Gibbs, Ph.D., Professor Emeritus
- Key H. Kim, Ph.D., Professor Emeritus
- Benjamin E. Wallacker, Ph.D., Professor Emeritus

**Affiliated Faculty**

- Martin Backstrom, Lecturer (*Chinese*)
- Kazue Chavez, Lecturer (*Japanese*)
- David Fahy, Lecturer (*Japanese*)
- Shun Guo, Lecturer (*Chinese*)
- Haruko Sakakibara, Lecturer (*Japanese*)
- Ritsuko Shigeyama, Lecturer (*Japanese*)
- Miyo Uchida, Coordinator (*Japanese*)
- Young Ming Wu, Lecturer (*Japanese*)
- Tianwei Xie, Coordinator (*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 has two tracks: one for students who have no background whatsoever in Japanese or Chinese, 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 UC International Summer Session programs, the Education Abroad Program, 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:

**Preparatory Subject Matter .....19/34**  
Chinese 1, 2, 3, 4, 5, 6; or 1BL, 2BL, 3BL; or 1CN, 2CN, 3CN; and one 4-unit lower division Chinese literature course; Chinese 1A may be substituted for courses 1 and 2.

Recommended:  
Chinese 10, 11, 50, Comparative Literature 14, Japanese 10, Linguistics 1, History 9A.

**Depth Subject Matter .....36**  
Chinese 106, 107, 111, 112, 113, 114 .....24  
Three courses selected from Chinese 104, 105, 108, 109A-I, 110, 115, 116, 120, 130, 131, 132, 140, 160 .....12

Recommended:  
Japanese 101, 102, 103, 104, 105, 106; Anthropology 148A-148B; Art History 163A-163B; East Asian Studies 113; History 190A-190B-190C, 191A-191B; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser.

**Total Units for the Chinese Major .....55/70**

**Japanese**

### A.B. Major Requirements:

**Preparatory Subject Matter .....15/30**  
Japanese 1, 2, 3, 4, 5, 6; or 8, 18, 28; Japanese 1A may be substituted for courses 1 and 2; Japanese 1B may be substituted for courses 1, 2, and 3.

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, 115, 131, 132, 133, 134, 135, 136, 201† .....8

Eight units selected from Chinese 104, 105, 106, 107, 109A-I, 110, 132; Anthropology 149A-149B; Art History 164; Comparative Literature 153; History 194A-194B-194C; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser .....8

**Total Units for the Japanese Major .....55/70**

†See College procedures governing undergraduate enrollment in a graduate course.

**Major Advisers.** R. Borgen (*Japanese*), C.N. Chang (*Japanese*), K. Kim (*History, Japanese*), S. Volpp (*Chinese*), M. Yeh (*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, 15, 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.

**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.

## Courses in Chinese (CHN)

### Lower Division Courses

**1. Elementary Chinese (5) I.** The Staff  
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.)

**\*1A. Intensive Elementary Modern Chinese (10) II.** The Staff  
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

**1BL. Accelerated Written Chinese I (5) I.** The Staff  
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.)

**\*1CN. Mandarin for Cantonese Speakers I (5) I.** The Staff  
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.)

**2. Elementary Chinese (5) II.** The Staff  
Lecture/discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

**2BL. Accelerated Written Chinese II (5) II.** The Staff  
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.)



**\*2CN. Mandarin for Cantonese Speakers II (5) II.** The Staff

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.)

**3. Elementary Chinese (5) III.** The Staff

Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of course 2. Completion of grammar sequence and continuing practice of all language skills.

**\*3A. Situational Chinese (2) I, III.** The Staff

Discussion—2 hours. Prerequisite: course 3 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and substitution drills, students have greater opportunities to develop spoken skills than is possible in course 3.

**3BL. Accelerated Written Chinese III (5) III.**

The Staff

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.)

**\*3CN. Mandarin for Cantonese Speakers III (5) III.** The Staff

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.)

**4. Intermediate Chinese (5) I.** The Staff

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.

**5. Intermediate Chinese (5) II.** The Staff

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.

**6. Intermediate Chinese (5) III.** The Staff

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.

**\*6A. Situational Chinese (2) I, III.** The Staff  
Discussion—2 hours. Prerequisite: course 6 (may be taken concurrently.) Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and oral repetition, students develop spoken fluency and appropriateness of expression as skills requisite to internships and study in China.

**10. Modern Chinese Literature (In English) (4) II.** The Staff

Lecture—3 hours; 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. GE credit: ArtHum, Div, Wrt.

**11. Great Books of China (in English) (4) II.** The Staff

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.

**\*50. Introduction to the Literature of China and Japan (3) II.** Yeh

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.

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses****\*104. Twentieth-Century Chinese Fiction (in English) (4) I.** The Staff

Lecture—3 hours; 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.

**\*105. Western Influences on Twentieth-Century Chinese Literature (in English) (4) III.** The Staff

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.

**106. Chinese Poetry (in English) (4) III.** Yeh

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.

**107. Traditional Chinese Fiction (in English) (4) I.** The Staff

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.

**\*108. Poetry of China and Japan (in English) (4) II.** Yeh

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.

**\*109A-I. Topics in Chinese Literature (in English) (4) III.** The Staff

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; (B) love in poetry; (C) women writers; (D) the knight-errant; (E) the city in fiction; (F) the recluse; (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.

**\*110. Great Writers of China: Texts and Context (in English) (4) I, II.** The Staff

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.

**111. Modern Chinese: Reading and Discussion (4) I.** The Staff

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.

**112. Modern Chinese: Reading and Discussion (4) II.** The Staff

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.

**113. Modern Chinese: Reading and Discussion (4) III.** The Staff

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.

**114. Introduction to Classical Chinese: Confucius (4) I.** The Staff

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.

**115. Introduction to Classical Chinese: Mencius (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.

**116. Introduction to Classical Chinese: Narrative Styles (4) III.** The Staff

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.

**120. Advanced Chinese (4) I, III.** The Staff

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 once for credit.

**\*130. Readings in Traditional Chinese Fiction (4) II.** The Staff

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 once for credit when content varies.

**131. Readings in Traditional Chinese Poetry (4) I.** The Staff

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.

**\*132. Readings in Modern Chinese Poetry (4) II.** Yeh

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.

**\*140. Readings in Classical Chinese (4) I, II, III.** The Staff

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 twice for credit.

**\*160. The Chinese Language (4) III.** The Staff

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.

**192. Chinese Internship (1-12) I, II, III.** The Staff  
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) I, II, III. The Staff  
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.)

**198. Directed Group Study**  
(1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
(P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

## Courses in Japanese (JPN)

### Lower Division Courses

**1. Elementary Japanese** (5) I. The Staff  
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.)

**\*1A. Intensive Elementary Japanese** (10) II. The Staff  
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

**\*1B. Accelerated Intensive Elementary Japanese** (15) Summer special session. The Staff  
Lecture/discussion—15 hours. Combines the work of courses 1, 2, and 3, into a single 12-week summer session. Those who complete this course may go on to course 4 in the fall.

**2. Elementary Japanese** (5) II. The Staff  
Lecture/discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.

**3. Elementary Japanese** (5) III. The Staff  
Lecture/discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.

**4. Intermediate Japanese** (5) I. The Staff  
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.

**5. Intermediate Japanese** (5) II. The Staff  
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.

**6. Intermediate Japanese** (5) III. The Staff  
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.

**8. Accelerated Japanese for Bilingual Students I** (5) I. The Staff  
Lecture—5 hours. Prerequisite: bilingual background in Japanese. A special course for students with some bilingual background in Japanese. Emphasis is on speaking at an educated level and learning to read and write Japanese. First of a three-course sequence accelerating advancement to upper division courses.

**\*10. Masterworks of Japanese Literature (In English)** (4) III. The Staff  
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.

**\*15. Introduction to Traditional Japanese Culture** (3) II. Borgen  
Lecture—2 hours; discussion—1 hour. General introduction to Japanese culture from its beginnings through 1850, focusing on religion, thought, and the arts (visual and performing). Indigenous traditions and the assimilation of foreign influences will be discussed. Readings and discussions in English. GE credit: ArtHum, Div, Wrt.

**18. Accelerated Japanese for Bilingual Students II** (5) II. The Staff  
Lecture—5 hours. Prerequisite: course 8. Continues course 8. A special course for students with some bilingual background in Japanese. Emphasis is on increasing knowledge of kanji and on reading and writing longer passages. Second of a three-course sequence accelerating advancement to upper division courses.

**\*25. Japanese Language and Culture (in English)** (4) I. Smith  
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.

**28. Accelerated Japanese for Bilingual Students III** (5) III. The Staff  
Lecture—5 hours. Prerequisite: course 18. Continues course 18. A special course for students with some bilingual background in Japanese. Emphasis is on advanced training in formal and informal speech styles, discourses strategies in spoken and written Japanese, and on reading authentic works. Third of a three-course sequence accelerating advancement to upper division courses.

**\*50. Introduction to the Literature of China and Japan** (3) II. Borgen  
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.

**98. Directed Group Study** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
(P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**101. Japanese Literature in Translation: The Early Period** (4) I. Borgen  
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.

**102. Japanese Literature in Translation: The Middle Period** (4) II. The Staff  
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.

**103. Japanese Literature in Translation: The Modern Period** (4) I. Chang  
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.

**\*104. Modern Japanese Literature: War and Revolution** (3) I. Chang  
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.

**\*105. Modern Japanese Literature: Hero and Anti-hero** (3) II. Chang  
Lecture/discussion—3 hours. The ways in which representative heroes and anti-heroes in modern Japanese literature perceive, confront, struggle with, and resolve a wide array of social, moral, and intellectual problems in their times. Lectures, discussions, and readings in English. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**106. Japanese Culture Through Film** (4) II. The Staff  
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.

**\*107. Modern Japanese Autobiographies (in English)** (4) I. Chang  
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.

**\*108. Poetry of China and Japan (in English)** (4) II. Borgen  
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.

**111. Modern Japanese: Reading and Discussion** (4) I. The Staff  
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.

**112. Modern Japanese: Reading and Discussion** (4) II. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continuation of course 111.

**113. Modern Japanese: Reading and Discussion** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Continuation of course 112.

**\*114A. Spoken Japanese** (2) I. The Staff  
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.)

**\*114B. Spoken Japanese** (2) II. The Staff  
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.)

**\*114C. Spoken Japanese** (2) III. The Staff  
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.)

**\*115. Japanese Composition** (2) I. The Staff  
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.

**\*131. Readings in Modern Japanese Literature: 1920-1945** (4) III. Chang

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.

**132. Readings in Modern Japanese Literature: 1945-1970** (4) III. Chang

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.

**\*133. Readings in Modern Japanese Literature: 1970 to Present** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Covers selected texts from 1970 to the present. Offered in alternate years.

**\*134. Readings in the Humanities: Traditional Culture** (4) II. Borgen

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.

**\*135. Readings in the Humanities: The Modern Period** (4) III. Chang

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.

**136. Readings in Newspapers and Magazines** (4) I. The Staff

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.

**\*141. Introduction to Classical Japanese** (4) III. Borgen

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.

**192. Japanese Internship** (1-12) I, II, III. The Staff  
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) I, II, III. The Staff  
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) I, II, III.  
The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**\*291. Seminar in Modern Japanese Literature: Major Writers** (4) III. Chang  
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.

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

## East Asian Studies

(College of Letters and Science)

Michelle Yeh, Ph.D., Program Director

Program Office, 522 Sproul Hall (530-752-4995)

**Faculty**

Beverly Bossler, Ph.D., Associate Professor (*History*)

Robert Borgen, Ph.D. Professor (*East Asian*

*Languages and Cultures, History*)

Lee Branstetter, Ph.D., Assistant Professor

(*Economics*)

Chia-ning Chang, Ph.D. Associate Professor (*East*

*Asian Languages and Cultures*)

Xiaojia Ge, Ph.D., Associate Professor (*Human and*

*Community Development*)

Kyu Hyun Kim, Ph.D. Assistant Professor (*East Asian*

*Languages and Cultures, History*)

Whalen W. Lai, Ph.D. Professor (*East Asian*

*Languages and Cultures, Religious Studies*)

Ming-cheng Lo, Ph.D. Assistant Professor

(*Sociology*)

Susan Mann, Ph.D., Professor (*History*)

Don C. Price, Ph.D., Professor (*History*)

Scott Rozelle, Ph.D., Associate Professor

(*Agricultural and Resource Economics*)

Barbara Sellers-Young, Ph.D., Associate Professor

(*Dramatic Art*)

Xiaoling Shu, Ph.D., Assistant Professor (*Sociology*)

G. William Skinner, Ph.D. Professor (*Anthropology*)

Janet S. Smith, Ph.D., Professor (*Anthropology*)

Sophie Volpp, Ph.D., Assistant Professor (*Chinese*)

Michelle Yeh, Ph.D., Professor (*East Asian*

*Languages and Cultures*)

**Emeriti Faculty**

Mary H. Fong, Ph.D., Professor Emerita

Donald Gibbs, Ph.D., Associate Professor Emeritus

Joyce K. Kallgren, Ph.D., Professor Emerita

Kwang-Ching Liu, Ph.D., Professor Emeritus

Benjamin Wallacker, Ph.D., Professor Emeritus

### 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.

**Career Alternatives.** The program provides preparation either for a career that involves working with East Asian affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field.

### A.B. Major Requirements:

UNITS  
**Preparatory Subject Matter** .....41-42  
History 9A, 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.** K. Kim.

### 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. Refer to departmental listings for course descriptions.

**Anthropology**

148A. Traditional Chinese Society  
148B. Family, Gender, and Population in Contemporary China

\*149A. Traditional Japanese Society  
\*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. 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

194B. Early Modern Japan

194C. Modern Japan

\*194D. Business and Labor in Modern Japan

\*194E. Education and Technology in Modern Japan

**Japanese**

All courses.

**Linguistics**

\*100. Languages of Eastern Asia

**Political Science**

\*133. The American Role in East Asia

\*138. International Relations: East Asia

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**

\*70. Introduction to Buddhism

\*75. Chinese Philosophy: An Introduction

\*172. Ch'an (Zen) Buddhism

**Sociology**

\*147. Sociological Perspectives on East Asia

**Courses in East Asian Studies (EAS)****Upper Division Courses**\*113. **Cinema and Society in China** (4) III.

The Staff

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.

192. **East Asian Studies Internship** (1-12) I, II, III. The Staff

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)

I, II, III. The Staff (Chairperson in charge)

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) I-II. The Staff Seminar—2 hours; conference—2 hours. Prerequisite: a GPA of 3.5 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) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Ecology (A Graduate Group)**

J. H. Lieth, Ph.D., Chairperson of the Group

Group Office, 2148 Wickson Hall (530-752-6752)

**Faculty.** The Group includes faculty from 26 departments in five schools and colleges, and the Bodega Marine Laboratory.

**Graduate Study.** The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in several areas of specialization within the spectrum of ecology. The Ecology program is one of the most diverse on the Davis campus. In order to accommodate varied student interests, the Group depends on close consultation between students and faculty for program development. Several curricular plans are now available in the following areas of emphasis: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy analysis, human ecology, integrative 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 two courses each in introductory biology, general chemistry and physics; one course each in calculus, ecology and evolution, statistics, are also required. Applicants in human ecology areas may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

**Graduate Advisers.** J.H. Lieth, K.M. Scow.**Courses in Ecology (ECL)****Graduate Courses**200A. **Principles and Application of Ecological Theory** (4) I. Foin

Lecture—3 hours; discussion—1 hour. Prerequisite: first course in ecology; Statistics 102; Mathematics 16A, 16B. Critical evaluation of ecological theory and applications to ecological management. Historical development of ecological theory is emphasized. Critical evaluation of ecological principles pertaining to the structure and dynamic properties of ecological systems, their organization and evolution.

200B. **Principles and Application of Ecological Theory** (4) II. Foin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A. Continuation of course 200A. Critical evaluation of theory and application in the areas of ecological adaptation and system plasticity, spatial and temporal scales, ecological energetics, and system dynamics. Synthesis of ecological theory into testable principles.

201. **Ecosystems and Landscape Ecology** (4) III. Ustin

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.

203. **Physiological Ecology** (3) III. Cech, Doroshov

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.

\*204. **Population and Community Ecology** (4) I. E. Caswell-Chen

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.

205. **Community Ecology** (4) II. Karban, Lawler  
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.

**206. Concepts and Methods in Plant**

**Community Ecology** (4) I. Rejmanek, Barbour  
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.

207. **Plant Population Biology** (3) II. Rice (Agronomy)

Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Agronomy 207.)

208. **Issues in Conservation Biology** (4) II.

Moyle

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 UCD conservation biology faculty.

210. **Advanced Topics in Human Ecology** (4) III.

Orlove

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in problems relating human populations and environmental variables. General epistemological issues and theoretical models are reviewed. Similarities and differences of human and biological ecology are examined. Offered in alternate years.

211. **Advanced Topics in Cultural Ecology** (3) I.

Orlove

Lecture—3 hours. Prerequisite: graduate standing. Discussion and evaluation of theories which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in alternate years. (Same course as Anthropology 211.)

212A. **Environmental Policy Process** (4) III.

Sabatier

Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Studies 160) or environmental law (e.g., Environmental Stud-



ies 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.)

#### 212B. Environmental Policy Evaluation (4) II.

Schwartz

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.)

#### 213. Population, Environment, and Social Structure (4) II. Cramer

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.

#### \*214. Use of Temporal/Spatial Landscape

##### Analysis in Conservation (4) II. Schonewald

Lecture/discussion—3 hours; laboratory—3 hours. Multi-disciplinary analysis of geometric and temporal landscape change applied to conservation. Population and economic change are examined in the context of the spread of urban, rural and transportation systems in fragmentation of habitat. Laboratory applies methodologies to analysis of specific sites. Offered in alternate years.

#### 215. Thermal Ecology and Energetics (3) II.

Weathers

Lecture—2 hours; discussion—1 hour. Prerequisite: general chemistry and physics and ecology (e.g., Environmental Studies 100). Review of principles that govern thermal and energy relations of organisms and the application of energy budget analysis to diverse ecological problems. Scaling (allometric analyses) and comparative methods emphasized as techniques for developing empirical ecological theories. Offered in alternate years.

#### 216. Ecology and Agriculture (3) I. Foin

Lecture/discussion—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 crop systems ecology. (Same course as Vegetable Crops 216.)

#### 217. Conservation and Sustainable Development in Third World Nations (4) III.

Orlove

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.)

#### 219. Ecosystem Biogeochemistry (4) III.

Dahlgren, Bledsoe

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.)

#### 222. Human Ecology of Agriculture (4) III.

Brush

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.

#### 225. Terrestrial Field Ecology (4) III. Karban

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.)

#### 231. Mathematical Methods in Population

##### Biology (3) I. Hastings

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.)

#### 232. Theoretical Ecology (3) II. Hastings

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.

#### 290. Seminar in Ecology (1-4) I, II, III. The Staff

(Chairperson in charge)

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.)

**291. Biological Conservation (3) II. Schonewald**  
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examines characteristics of populations that make them vulnerable to extinction and examines various methods that can be used in the restoration process. Although both plants and animals are of interest, emphasis will be on vertebrates. Offered in alternate years.

#### 296. Topics in Ecology and Evolution (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by visiting lecturers, UCD faculty, and graduate students. May be repeated for credit. (Same course as Population Biology 292.) (S/U grading only.)

#### 297T. Tutoring in Ecology (1-4) I, II, III. The Staff

(Chairperson in charge)

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) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

#### 299. Research (1-12) I, II, III. (Chairperson in charge)

Prerequisite: graduate standing. (S/U grading only.)

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## Economics

(College of Letters and Science)

Martine Quinzii, Ph.D., Chairperson of the Department

Department Office, 1113 Social Sciences and Humanities Building (530-752-0741)

### Faculty

Paul Bergin, Ph.D., Assistant Professor  
Giacomo Bonanno, Ph.D., Professor  
Lee Branstetter, Ph.D., Assistant Professor  
Colin Cameron, Ph.D., Associate Professor  
Gregory Clark, Ph.D., Professor  
Robert C. Feenstra, Ph.D., Professor  
L. Jay Helms, Ph.D., Associate Professor  
Kevin D. Hoover, D.Phil., Professor  
Oscar Jorda, Ph.D., Assistant Professor  
Peter H. Lindert, Ph.D., Professor, *Academic Senate*

#### *Distinguished Teaching Award*

Louis Makowski, Ph.D., Professor  
Klaus Nehring, Ph.D., Assistant Professor  
Alan L. Olmstead, Ph.D., Professor  
Marianne E. Page, Ph.D., Assistant Professor  
Martine Quinzii, Ph.D., Professor  
John E. Roemer, Ph.D., Professor  
Kevin D. Salyer, Ph.D., Associate Professor  
Steven M. Sheffrin, Ph.D., Professor  
Joaquim Silvestre, Ph.D., Professor  
Deborah Swenson, Ph.D., Assistant Professor  
Gary M. Walton, Ph.D., Professor (*Economics, Management*)

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*  
Hiromitsu Kaneda, Ph.D., Professor Emeritus  
Thomas Mayer, Ph.D., Professor Emeritus  
T. Y. Shen, Professor Emeritus  
Elias H. Tuma, Ph.D., Professor Emeritus  
Leon L. Wegge, Ph.D., Professor Emeritus

## 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        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                         | <b>19-22</b> |
| Economics 1A-1B.....                                                                                                                                                                            | 10           |
| Statistics 13, 32, or 102.....                                                                                                                                                                  | 3-4          |
| Mathematics 16A-16B or 21A-21B.....                                                                                                                                                             | 6-8          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                               | <b>42</b>    |
| Economics 100, 101.....                                                                                                                                                                         | 10           |
| One course from Economics 110A, 110B, 111A, 111B.....                                                                                                                                           | 4            |
| Select 16 units from Economics 103, 116, 121A, 121B, 125, 130, 131, 134, 136A, 136B, 140, 151A, 151B, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 106, 139, 156, 175, 176.... | 16           |
| Additional upper division Economics courses.....                                                                                                                                                | 12           |
| <b>Total Units for the Major</b> .....                                                                                                                                                          | <b>61-64</b> |

**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:**

|                                                                                                                                                                                   |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Economics</b> .....                                                                                                                                                            | <b>22</b> |
| Economics 100, 101.....                                                                                                                                                           | 10        |
| Select 8 units from Economics 103, 116, 121A, 121B, 125, 130, 131, 134, 136A, 136B, 140, 151A, 151B, 160A, 160B; Agricultural and Resource Economics 106, 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 3.5 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.

**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 contact the chairperson of the departmental graduate committee.

**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** (5) I, II, III.

The Staff

Lecture—3 hours; discussion—2 hours. Courses 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.

**1B. Principles of Macroeconomics** (5) I, II, III.

The Staff

Lecture—3 hours; discussion—2 hours. Courses 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.

**\*90X. Lower Division Seminar** (1-2) I. The Staff  
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) I, II, III.

The Staff

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Individual Study for Undergraduates** (1-5) I, II, III, The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****100. Intermediate Micro Theory** (5) I, II, III.

The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A, 1B; Mathematics 16A-16B or 21A-21B with a grade of a C- or better in each course. 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. Only 2 units of credit will be allowed to students who have credit for course 104.

**101. Intermediate Macro Theory** (5) I, II, III.

The Staff

Lecture—4 hours; discussion 1 hour. Prerequisite: courses 1A, 1B; Mathematics 16A-16B or 21A-21B with a grade of a C- or better in each course. Theory of income, employment and prices under static and dynamic conditions, and long term growth. Only 2 units of credit will be allowed to students who have credit for course 105.

**103. Economics of Uncertainty and Information** (4) II. Bonnano

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, 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.

**\*104. Intermediate Microeconomics** (4) I.

Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B and Mathematics 16A or 21A. Price and distribution theory under conditions of perfect and imperfect competition. Not open for credit to stu-

dents who have completed course 100 or Agricultural and Resource Economics 100A or 100B. Intended for non-majors. GE credit: SocSci.

**105. Intermediate Macroeconomics** (4) I.

Bergin; II. Sheffrin; III. Jorda

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B and Mathematics 16A or 21A. Theory of income, employment and prices, with policy implications. Not open for credit to students who have completed course 101. Intended for non-majors. GE credit: SocSci.

**\*110A. European Economic History Before 1700** (4) I. Clark

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Topics in economic change in Europe prior to year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. GE credit: SocSci, Div.

**110B. European Economic History Since 1700** (4) III. Clark

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A-1B or consent of instructor. Topics in economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development. GE credit: SocSci.

**111A. Economic History** (4) I. Walton

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.

**111B. Economic History** (4) II. Lindert

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.

**115A. Economic Development** (4) I, II. Rozelle (Agricultural and Resource Economics)

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.

**115B. Economic Development** (4) II, III.

The Staff

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.

**\*116. Comparative Economic Systems** (4) II.

Roemer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, Mathematics 16A and 16B, or 21A and 21B. Economic 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. GE credit: SocSci.

**121A. Industrial Organization** (4) II. Bonanno

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 104, 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.

**\*121B. Industrial Organization** (4) III. Borenstein

Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries. GE credit: SocSci.

**122. Theory of Games and Strategic Behavior**

(4) III. Bonanno

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, Mathematics 16B or 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.

**130. Public Microeconomics** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, 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.

**131. Public Finance** (4) I. Helms

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104. Assessing the 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.

**134. Financial Economics** (4) II. Nehring; III. Quinzii

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104; 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.

**\*135. Money, Banks and Financial Institutions** (4) III. Hoover

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

**136A. Monetary Theory** (4) I. Makowski

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 105. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

**136B. Monetary Policy** (4) II. Salyer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 136A. Analysis of the role of financial intermediaries in the economy and the theory and practice of monetary policy.

**140. Econometrics** (4) II. Jorda

Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 100 or 104, and 101 or 105; Mathematics 16A-16B or 21A; Statistics 13. Introduction of 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 and exercises in applied economics.

**151A. Economics of the Labor Market** (4) I. Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104. Theory of labor supply and demand; determination of wages and employment in the labor market. Economic theories of labor unions. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages.

**151B. Economics of Human Resources** (4) II. Page

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 distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy.

**160A. International Microeconomics** (4) I.

Feenstra; II. Branstetter

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 104, or consent of instructor. International trade theory: impact of trade on the domestic and world economies; public policy toward external trade. Only 2 units of credit allowed to students who have completed course 162.

**160B. International Macroeconomics** (4) I.

Swenson; III. Bergin

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104, and course 101 or 105, 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 2 units of credit allowed to students who have completed course 162.

**162. International Economic Relations** (4) I.

Swenson; II. Branstetter

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.

**171. Economy of East Asia** (4) III. Branstetter

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.

**190. Topics in Economics** (4) II. Cameron,

Lindert; III. Nehring, Clark

Lecture/discussion-seminar—4 hours. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

**\*190X. Upper Division Seminar** (1-4) I. The Staff

Seminar—1-4 hours. Prerequisite: courses 100 or 104; and 101 or 105; and consent of instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work. May not be repeated for credit. Limited enrollment.

**192W. Internship in the Davis-in-Washington Program** (6-8) I, III. The Staff

Internship—18-24 hours. Prerequisite: junior or senior standing in Economics; completion of 84 units of credits with a minimum grade-point average of 3.00; 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) I-II-III. The Staff (Lindert in charge)

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 3.5 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) I, II, III.

The Staff (Chairperson in charge)

Tutoring—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. Units may not be counted toward satisfaction of major requirements. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced**

Undergraduates (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****200A. Microeconomic Theory** (5) I. Silvestre

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.)

**200B. Microeconomic Theory** (5) II. Quinzii

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.)

**200C. Microeconomic Theory** (5) III. Makowski

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.)

**200D. Macroeconomic Theory** (5) II. Sheffrin

Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macro static theory of income, employment, and prices.

**200E. Macroeconomic Theory** (4) III. Salyer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 200D. Macrodynamical theory of income, employment, and prices.

**\*201A. History of Economic Thought** (4) III.

Hoover

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) III.

Hoover

Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

**\*203A. Advanced Economic Theory** (4) I. Quinzii

Lecture—4 hours. Prerequisite: course 200A, 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty.

**\*203B. Advanced Economic Theory: Game**

Theory (4) II. Roemer

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 (or Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory.

**\*203C. Topics in Economic Theory** (4) III.

Nehring

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.

**204. Microeconomic Analysis** (5) I. Sexton

(Agricultural and Resource Economics)

Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A-100B; Mathematics 21A, 21B and 21C (or Mathematics 16A, 16B and 16C); open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Agricultural and Resource Economics 204.)

**\*207. Contemporary Economics Seminar** (1) I,

II, III. The Staff

Seminar—1 hour. Prerequisite: graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.)

**\*209A. Economics of Distributive Justice** (4) I.



Roemer

Lecture—4 hours. Prerequisite: course 200B. Introduction to social choice theory; envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers J. Rawls, R. Dworkin, R. Nozick, and G.A. Cohen. Offered in alternate years.

**\*209B. Public Ownership Economics (4) III.**

Silvestre

Lecture—4 hours. Prerequisite: course 200B. Public ownership from the viewpoint of microeconomics, in particular general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.

**\*209C. Foundations of Decision Theory (4) II.**

Nehring

Lecture—4 hours. Prerequisite: course 200B. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include intertemporal decision; learning; incompleteness and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

**210A. Economic History (4) III.** Clark

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.

**210B. Economic History (4) I.** Olmstead

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) II.** Lindert

Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)

**214. Development Economics (4) I.** Rozelle

(Agricultural and Resource Economics)

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.)

**215A. Agriculture and Economic Development (4) I.** Taylor (Agricultural and Resource Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 200A or 204 and 214. Agricultural development theory and application. Analysis of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household-farm and intersectoral models. (Same course as Agricultural and Resource Economics 215A.)

**\*215B. Open Macroeconomics of Development (4) II.** Woo

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.)

**\*215C. Empirical Approaches to Development Analysis (4) III.** Taylor (Agricultural and Resource Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 215A, 215B. Extension of development models for policy analysis including Household-Farm models, models of resource allocation under uncertainty.

Social Accounting Matrix and Computable General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income-distribution weights. (Same course as Agricultural and Resource Economics 215C.)

**\*215D. Environment and Economic Development (4) III.** Farzin (Agricultural and Resource Economics)

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.)

**\*221A. Industrial Organization (4) I.** Bonanno

Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference.

**\*221B. Industrial Organization (4) II.** Branstetter

Lecture—2 hours; seminar—2 hours. Social standards and public policies toward the business sector of the economy.

**\*221C. Topics in Industrial Organization (4) III.**

The Staff

Lecture—3 hours; seminar—1 hour. Prerequisite: course 221A. Advanced topics in industrial organization and in applied microeconomics. Emphasis on current research. Content may vary from year to year.

**\*225. Urban Economics (4) III.** The Staff

Lecture—2 hours; discussion—2 hours. Prerequisite: course 200A or 204. Explains development of cities and land-use patterns within cities. Explores efficiency and equity effects of local spending and taxes. Analysis of urban problems such as transportation (congestion, pollution, mass transit), crime, and inadequate housing.

**230A. Public Economics (4) I.** Helms

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; evaluation of effective tax rates.

**230B. Public Economics (4) II.** Page

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Effects of tax policies on economic behavior; production, consumption, savings, investment, and labor supply. Distribution and equity; social welfare evaluation and the measurement of inequity.

**230C. Public Economics (4) III.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Advanced topics in economics of the public sector, with emphasis on current research. Content may vary from year to year.

**235A. Alternative Approaches to Monetary Analysis (4) II.** Hoover

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.

**235B. Monetary Theory (4) III.** Salyer

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.

**\*235C. Monetary Policy (4) II.** The Staff

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.

**240A. Econometric Methods (4) II.** Green

(Agricultural and Resource Economics)

Lecture—4 hours. 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.)

**240B. Econometric Methods (4) III.** Chalfant

(Agricultural and Resource Economics)

Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regression, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Agricultural and Resource Economics 240B.)

**240C. Econometric Theory (4) II.** Jorda

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Agricultural and Resource Economics 240C.)

**240D. Topics in Econometrics (4) I.** Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240D.)

**\*250A. Labor Economics (4) II.** The Staff

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.

**\*250B. Labor Economics (4) III.** The Staff

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.

**256. Applied Econometrics (4) II.** Heien

(Agricultural and Resource Economics)

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.)

**260A. International Economics (4) I.** Feenstra

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions.

**260B. International Economics (4) II.** Woo

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.

**260CN. International Investment and Trade (4) II,**

III. Swenson

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.

**260D. Topics in International Macroeconomics (4) III.** Bergin

Seminar—4 hours. Prerequisite: course 260B or consent of instructor. Survey of current literature in international macroeconomic theory.

**260E. Topics in International Trade (4) III.**

Swenson

Seminar—4 hours. Prerequisite: course 260A, 260B. Current literature in international trade theory.



**\*280. Orientation to Economic Research (2) I.**

The Staff

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) I, II, III.** The Staff Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit.

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge) Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Individual Study (1-12) I, II, III.** The Staff (Chairperson in charge) Prerequisite: consent of instructor and graduate standing. (S/U grading only.)

**299D. Dissertation Research (1-12) I, II, III.** The Staff (S/U grading only.)

**Professional Course**

**397. Teaching of Economics (2) I.** Walton 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.)

## Economy, Justice, and Society

John E. Roemer, Ph.D., Program Director and Professor of Economics  
Program Office, 1135 Social Sciences and Humanities Building (530-752-0743)

**Committee in Charge**

Josephine Andrews, Ph.D. (*Political Science*)  
Fred Block, Ph.D. (*Sociology*)  
David Copp, Ph.D. (*Philosophy*)  
Gerald Dworkin, Ph.D. (*Philosophy*)  
Scott Gartner, Ph.D. (*Political Science*)  
Robert Jackman, Ph.D. (*Political Science*)  
Klaus Nehring, Ph.D. (*Economics*)  
Marianne E. Page, Ph.D. (*Economics*)  
John Roemer, Ph.D. (*Economics*)  
Joaquim Silvestre, Ph.D. (*Economics*)

**Programs of Study.** Undergraduates may elect the minor in Economy, Justice, and Society. The Program on Economy, Justice, and Society also offers a *designated emphasis* in Economy, Justice, and Society open to students pursuing a doctoral degree in philosophy, political science, or economics (see below).

**Minor Program Requirements:**

A central concern of many citizens in modern societies is the inequality of income and life changes characteristic of them. In the United States, this concern has recently deepened, as income inequality has worsened substantially. The minor in Economy, Justice, and Society studies economic, political, sociological, and philosophical perspectives on such inequality.

UNITS

**Economy, Justice, and Society .....24**

Six upper division courses selected from Economics 116, 130, Philosophy 116, 118, Political Science 124, 142, 174, Sociology 118, 138, 140.

No more than two courses from a single department of program may be offered in satisfaction of the minor requirements.

When a listed course has prerequisites, they too must be taken, although they do not count toward the six-course requirement.

**Graduate Study.** The Program on Economy, Justice, and Society offers a *designated emphasis* in Economy, Justice, and Society open to students pursuing a doctoral degree in philosophy, political science, or economics. The designated emphasis provides interdisciplinary training in related aspects of economic theory, political theory, and political philosophy. Students take one or two core courses offered by the program, a designated field in their home department, a choice of two designated courses in the other two departments, and attend an advanced workshop/seminar run by the program. For students choosing the emphasis, these requirements will be in lieu of some requirements for the Ph.D. in the participating departments. Upon graduation, students receive a Ph.D. in their major with a designated emphasis in Economy, Justice, and Society.

**Graduate Adviser.** Consult program office or a program graduate adviser in one of the three departments listed above.

## Courses in Economy, Justice, and Society (EJS)

**Upper Division Course**

**\*100. Microeconomic Theory (4) III.** Nehring Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or graduate standing. Basic concepts, modes of reasoning and fundamental results in modern microeconomics. Emphasis on, first, Utility Theory; second, the logic of the equilibrium method; third, welfare economics and public policy.

**Graduate Courses**

**207. Interdisciplinary Social Analysis (3) III.** The Staff

Lecture—2 hours; term paper. Prerequisite: graduate standing in Economics, Philosophy, or Political Science; course 100, Philosophy 117, or the equivalents. Analysis of practical and theoretical social problems with tools of economic theory, philosophy, and political theory, e.g., the welfare state, risk and public policy, equality of opportunity, individual rationality and cooperation.

**\*209A. Economic Models of Distributive Justice (4) I.** Roemer

Lecture—4 hours. Prerequisite: course 100 or the equivalent, and graduate standing. Introduction to social choice theory; envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers. Offered in alternate years.

**\*209B. Economic Models of Public Ownership (4) III.** Silvestre

Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Public ownership from the viewpoint of microeconomics, in particular, general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.

**\*209C. Foundations of Decision Theory (4) II.** Nehring

Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include intertemporal decision; learning; incompleteness and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

## Education

(Intercollege Division)

Fred H. Genesee, Ph.D., Director of the Division (2079 Academic Surge)

Robert A. DeVillar, Ph.D., Director of the UC Educational Research Center, Fresno and UC Co-Director of the UCD/CSU Fresno Joint Doctoral Program in Educational Leadership, Fresno

Barbara J. Merino, Ph.D., Director of Teacher Education

Barbara G. Goldman, Ph.D., Associate Director of Teacher Education

Sandra M. Murphy, Ph.D., Director, CRESS Center  
Jill Wilson, Ph.D., Executive Director, CRESS Center  
Division Office, 2074 Academic Surge  
(530-752-8258; Fax: 530-752-5411)

Student Services, 2078 Academic Surge  
(530-752-0757)

CRESS Center Office, 2060 Academic Surge  
(530-752-0281; Fax: 530-752-6135)

UCD/CSU Fresno Joint Doctoral Program Office,  
5005 North Maple Ave., Fresno, CA 93740-  
0117 (209-278-0427; Fax: 209-278-0457)

UC Educational Research Center, Fresno, 351 East  
Barstow Ave., Suite 101, Fresno, CA 93710  
(209-228-2050; Fax: 209-228-2055)

**Faculty**

Robert A. DeVillar, Ph.D., Associate Professor  
Sharon S. Dugdale, Ph.D., Professor  
Richard A. Figueroa, Ph.D., Professor  
Patricia C. Gandara, Ph.D., Associate Professor  
Fred H. Genesee, Ph.D., Professor  
Barbara G. Goldman, Ph.D., Lecturer in and  
Supervisor of Teacher Education (*Education,  
Human and Community Development*)

Pauline V. Holmes, M.A., Supervisor of Teacher Education

Anna T. Kato, Ed.D., Supervisor of Teacher Education

Maureen McMahon, Ph.D., Assistant Professor  
Barbara J. Merino, Ph.D., Professor

Sandra M. Murphy, Ph.D., Professor  
J. Richard Pomeroy, M.A., Supervisor of Teacher Education

Jonathan H. Sandoval, Ph.D., Professor  
Robert M. Van Dyne, Ed.D., Supervisor of Teacher Education

Jon Wagner, Ph.D., Professor

David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education

Karen A. Watson-Gegeon, Ph.D., Professor

**Emeriti Faculty**

Donald G. Arnstine, Ph.D., Professor Emeritus  
Hugh C. Black, Ph.D., Professor Emeritus  
G. Phillip Cartwright, Ph.D., Professor Emeritus  
Concha Delgado-Gaitan, Ph.D., Professor Emerita  
Douglas L. Minnis, Ed.D., Lecturer Emeritus  
Julius M. Sassenrath, Ph.D., Professor Emeritus  
Carlton J. Spring, Jr., Ph.D., Professor Emeritus  
George D. Yonge, Ph.D., Professor Emeritus

**Cooperative Research and Extension Services for Schools (CRESS) Staff**

Pam Castori, M.A., Director, California Science Project—Sacramento; Education Extension Specialist for Science

Kathy Dixon, Ph.D., Publications Coordinator  
Barbara Hoffman, M.A., Director, Sierra North Arts Project

Pauline Holmes, M.A., Associate Director for Inservice Programs, Area 3 Writing Project

Judith Kysh, M.A., Education Extension Specialist for Mathematics; Co-Director, College Preparatory Mathematics; Director, Northern California Mathematics Project

Rachel Lodge, M.A., Associate Director, Healthy Start Field Office  
 Jayne Marlink, M.A., Director, Area 3 Writing Project  
 Rollie Otto, Ph.D., Director of the California Science Project  
 Keith Prior, B.A., Systems Analyst, Healthy Start Field Office  
 Tom Sallee, Ph.D., Co-Director, College Preparatory Mathematics Project  
 Lisa R. Villarreal, M.A., Director, Healthy Start Field Office  
 Jill Wilson, Ph.D., Associate Director, CRESS Center

**Affiliated Faculty**

Kathy Medina, M.A., Director, Area 3 History and Cultures Project

**Major Program and Graduate Study.** The Division of Education offers a minor and programs of graduate study described below. There is no undergraduate major in education.

**Minor Program Requirements:**

Education theory is considered to be the foundation for undergraduates to elect as a minor if they wish to (1) major in an allied program, (2) obtain a teaching credential, (3) obtain a master's degree in education or related field, (4) obtain a Ph.D. degree in education, (5) enter a profession that focuses on work with people, (6) seek employment in a governmental or industrial training program, or (7) obtain a better understanding of the issues and concerns of public and private education.

At least 16 units of the 20-unit minimum for the minor must be in Education. One course in a related field is acceptable for the minor.

UNITS

|                               |           |
|-------------------------------|-----------|
| Education.....                | <b>20</b> |
| Education 100, 110, 120 ..... | 12        |
| Elective courses .....        | 8         |

The remaining 8 units may be taken from the following courses in Education, with the option of selecting one course from the list of approved elective courses outside of Education:

*Education:*

Education 115, 130, 151, 152, 153, 163

*Approved courses outside of Education:*

Agricultural Education 100, 160, Human Development 100A, 100B, 101, 103, Linguistics 163, 166, 167, Psychology 130, 132, 136

**Minor Advisers.** A designated faculty member in the Division of Education may advise students and give final approval on the minor. For additional advising and information, contact D. Wampler (530-752-3196; e-mail: drwampler@ucdavis.edu), or the Student Services Office, 2078 Academic Surge.

**Graduate Study**

The Division of Education, in conjunction with the Graduate Group in Education, offers programs of study and research leading to the M.A. and Ph.D. degree in Education. The Ph.D. is offered by the Education Graduate Group. Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator, Division of Education, 2078 Academic Surge.

**Graduate Coordinator.** K. Bray.

**Graduate Advisers (M.A. and Ph.D. degree).** J. Sandoval, P. Gandara, J. Wagner.

**Teacher Education—Credentialing**

For a statement of complete requirements and appointments with credential advisers, contact the Student Services, 2078 Academic Surge. Interested students are urged to do this as early as possible in their academic career.

Applicants to the elementary or secondary teaching credential programs should contact Student Services for forms and procedural information early in the **fall quarter** of their senior year.

**Teacher Education Faculty Advisers—Elementary.** D.R. Wampler.

**Bilingual Emphasis.** B.J. Merino.

**Teacher Education Faculty Advisers—Secondary.** P. Holmes, R. Van Dyne.

**Graduate Adviser.** B. Merino, B. Goldman (Teaching Credential Program).

**UCD/CSU Sacramento Collaborative Elementary Credential Program**

Barbara Goldman (UC Davis) and René Merino (CSU Sacramento), Program Directors

Program Office, 2078 Academic Surge  
 (530) 1-888-smr-2-1rn;  
 e-mail: smrtolrn@ucdavis.edu

The Collaborative Elementary Credential Program offers accelerated course work for the CLAD or BCLAD elementary credential during the summers; the supervised field experience is completed during the academic year. This program is designed to meet the needs of emergency credential holders and working professionals who are changing careers.

**UCD/CSU Fresno Joint Doctoral Program (Ed.D.)**

Karen Carey, (CSU Fresno) and Robert DeVillar (UC Davis), Program Directors

UC Davis Office, 2078 Academic Surge  
 (530-752-0761; Fax, 530-752-5411);  
 e-mail: kbray@ucdavis.edu

CSU Fresno Program Office  
 (209-278-0427; Fax: 209-278-0457);  
 e-mail: diane\_rivera-pasillas@csufresno.edu

The joint (UCD/CSU Fresno) doctoral program leads to the Doctorate in Education (Ed.D.) in Educational Leadership. Contact the CSU Fresno Program Office for information and application materials.

**Courses in Education (EDU)**

**Lower Division Course**

**98. Directed Group Study (1-5) I, II, III.** The Staff (Director in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**Upper Division Courses**

**100. Introduction to Schools (4) I, II, III.**

Wampler  
 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.

**110. Educational Psychology: General (4) I, II, III.** The Staff (Director in charge)  
 Lecture/discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SocSci, Wrt.

**\*114. Quantitative Methods in Educational Research (4) I.** The Staff (Director in charge)  
 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.

**115. Educating Children with Disabilities (2) II, III.** Figueroa, Sandoval  
 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.

**120. Philosophical and Social Foundations of Education (4) III.** Wagner  
 Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. GE credit: SocSci, Wrt.

**130. Issues in Higher Education (4) III.** The Staff (Director in charge)  
 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.

**151. Language Development in the Chicano Child (3) I.** Merino  
 Lecture—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.

**152. Communication Skills for Bilingual Teachers (3) III.** The Staff (Merino in charge)  
 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.

**\*153. Cultural Diversity and Education (2) III.** The Staff (Director in charge)  
 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.

**160A. Introduction to Peer Counseling (2) I, II.** Counseling Center Staff  
 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.)

**160B. Issues in Peer Counseling (2) I, II, III.** Counseling Center Staff  
 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 once for credit when topic differs. (P/NP grading only.)

**\*163. Guidance and Counseling (4) III.** Figueroa, Sandoval  
 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.

**\*180. Computers in Education (3) I, II, III.** Dugdale  
 Lecture—1 hour; seminar—1 hour; laboratory—1 hour. Prerequisite: upper division standing or graduate student. Applications of computers in education as instructional, intellectual, and communication tools. Not open for credit to students who have taken course 181 or 182.

**\*181. Instructional Applications of Computers (2)**  
 Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: Agricultural Systems and Environment 21 or appropriate microcomputer course, and consent of instructor. Applications of computers in K-12 instruction, with emphasis on software selection and use, subject and grade level focus, and curricular integration. Intended for students who already possess experience and skill with a variety of microcomputer applications, this course does not include the more general topics covered in course 180. Not open for credit to students who have completed course 180 or 182.

**\*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 experi-

\*Course not offered this academic year.

ence with instructional use of computers and related technologies. Not open for credit to students who have completed course 180 or 181.

**192. Internship** (1-3) I, II, III. The Staff  
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 once for credit. (P/NP grading only.)

**197T. Tutoring in Education** (1-2) I, II, III.  
The Staff (Director in charge)

Tutoring—1-2 hours. Prerequisite: upper division standing and consent of instructor. Leading of small voluntary discussion groups affiliated with the Division'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 once for credit for a total of 4 units. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.  
The Staff (Director in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**200. Educational Research** (4) III. Sandoval  
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.

**201. Qualitative Research in Education** (4) III.  
Wagner

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., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). (Former course 203.)

**\*202. Philosophy of Education: Models and Methods** (4) III. The Staff (Director in charge)

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examples of some major philosophical points of view about educational aims, illustrations of several types of philosophical discourse and argumentation, and an opportunity for students to locate and critique some contemporary studies in the philosophy of education. Offered in alternate years.

**203. Educational Testing and Evaluation** (4) II.  
Gandara

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.

**205A. Ethnographic Research in Schools I: Current Theory and Practice** (4) I.  
Watson-Gegeo

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. (Former course 201A.)

**205B. Ethnographic Research in Schools II: Field-Based Research Projects** (4) II.

Watson-Gegeo

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 inferring by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. (Former course 201B.)

**207. Concepts of the Curriculum** (4) I. The Staff (Director in charge)

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.

**210. The Psychology of School Learning** (4) I.  
Sandoval

Lecture/discussion—4 hours. Study of human learning theory and research related to learning in school. Classical approaches of scholars such as Ausubel, Brunner, Gagne, Piaget, Vygotsky, Skinner. Review of contemporary issues of constructivism, metacognition, problem solving, learning strategies, science and mathematics learning.

**\*211. Psychopedagogics** (4) II. The Staff (Director in charge)

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological aspects of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

**\*213. Individual Assessment** (4) III. Sandoval

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.

**\*214. Assessment of Children's Personality** (4) III. Sandoval

Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 213 and 218; and familiarity with basic personality theory and theories of motivation. Study of the projective hypothesis; concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment of social and affective functioning; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in alternate years.

**215. Research on Achievement Motivation in Education** (4) II. Spring

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.

**\*216. School-Based Prevention Programs** (4) III. Sandoval

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Promotion of health and mental health in schools. Topics include the theoretical base, prevention models, specific examples of techniques and programs designed to prevent learning and adjustment problems, and evaluation issues. Offered in alternate years.

**\*218. Testing Minority Children** (4) I. Figueroa

Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizing tests and techniques that are appropriate

for use with Hispanic students. The use of multicultural pluralistic assessment. Review studies and guidelines on use of tests with minority children. Offered in alternate years.

**221. Culture and Social Organization of Schools** (4) I. Wagner, Gandara

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) II. Wagner

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. (Former course 204.)

**\*223. Education and Social Policy** (4) III.  
Gandara

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. Offered in alternate years. (Former course 237.)

**226. Culture and Social Organization of Higher Education** (4) II. Wagner, Sandoval, Gandara

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. Offered in alternate years.

**\*231. Culture and Learning** (4) II.  
Delgado-Gaitan

Seminar—4 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analysis of major theories of relationships between learning and the sociocultural context in which learning takes place, issues related to the academic achievement of different language groups, and implications for research and pedagogical reform.

**\*232. Families and Communities as Educational Contexts** (4) I. Delgado-Gaitan

Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Families and cultural communities are important social contexts of education for children. An interdisciplinary perspective is presented in an attempt to understand how learning in these social contexts influences the schooling of children.

**\*233. Anthropology of Education** (4) I.  
Delgado-Gaitan

Seminar—3 hours; term paper. Prerequisite: one of the following courses: Anthropology 117, 127, 129, or 222, or course 231, 201A, or 201B, or consent of instructor. Uses concepts of anthropology to examine education in such settings as family, community, and formal institutions of schooling. Course goal is to raise questions about educational issues often taken for granted and provide a perspective from which problems may be analyzed. Offered in alternate years. (P/NP grading only.)

**\*235. Critical Pedagogy** (4) III. Delgado-Gaitan  
Seminar—4 hours. Prerequisite: Critical Theory 200A and graduate standing. A sociocultural 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.

**\*241. Research on Reading and Spelling Acquisition** (4) III. Murphy

Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of research on psychological processes in learning to read and spell. Topics include writing sys-



tems, theories of processes and acquisition, emergent reading, readiness, decoding, word reading, oral text reading, spelling stages, instructional methods, disability, dialect. Offered in alternate years.

**242. Research on Text Comprehension (4) III.** The Staff (Director in charge)  
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.

**243. Research on the Teaching and Learning of Writing (4) III.** Murphy  
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.

**249. Discourse Analysis in Educational Settings (4) II.** Watson-Gegeo  
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. (Former course 239.)

**\*251. Research in Bilingual and Second Language Education (3) III.** Merino  
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. Offered in alternate years.

**\*252. Multicultural Teaching and Curriculum (3) III.** Merino  
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. Offered in alternate years.

**253. Language and Literacy in Linguistic Minorities (3) II.** Merino, Watson-Gegeo  
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.

**255. Curriculum Development and Evaluation in Mathematics (4) I.** Dugdale  
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.

**256A. Research in Mathematics Education (4) II.** Dugdale  
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.

**\*256B. Research in Mathematics Education (4) II.** Dugdale  
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.

**\*257. Computer Technology in Mathematics Education (4) III.** Dugdale  
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.

**\*275. Effective Teaching (4) I.** The Staff (Director in charge)  
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.

**290C. Research Conference in Education (1) I, II, III.** The Staff (Director in charge)  
Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by graduate students with their major professor. May be repeated twice for credit. (S/U grading only.)

**291. Proseminar in Education (3) I, II.** Sandoval  
Seminar—3 hours. Prerequisite: admission to the Ph.D. graduate program in Education. Seminar for first-year education doctoral students. The study of multi-disciplinary research approaches to educational issues. Reports and discussions of recent advances in education. Speakers from the graduate group faculty in Education. May be taken twice for credit.

**292. Special Topics in Education (2-4) I, II, III.** The Staff (Director in charge)  
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.

**\*293. Topical Seminar in School Psychology (3) I, III.** Sandoval  
Seminar—3 hours. Prerequisite: graduate standing in Education and consent of instructor. Critical study of selected issues in education and school psychology related to the learning and mental health of children and adolescents in schools. May be repeated once for credit.

**298. Group Study (1-5) I, II, III.** The Staff (Director in charge)  
(S/U grading only.)

**299. Individual Study (1-6) I, II, III.** The Staff (Director in charge)  
Independent study—3-18 hours. Individual study under the direction of a faculty member. (S/U grading only.)

**299D. Research (1-12) I, II, III.** The Staff (Director in charge)  
Independent study—3-36 hours. Research for individual graduate students. (S/U grading only.)

**Professional Courses**

**300. Reading in the Elementary School (4) III.** The Staff (Merino in charge)  
Lecture—3 hours; field work—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.

**301. Reading in the Secondary School (4) I, II.** Murphy  
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.

**302. Language Arts in the Elementary School (2) I.** The Staff (Merino in charge)  
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 (3) III.** The Staff (Merino in charge)  
Lecture/discussion—2 hours; laboratory—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 with emphasis on cross-discipline exploration.

**304A. Teaching in the Elementary Schools (2-18) I.** Director of Teacher Education in charge  
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.

**304B. Teaching in the Elementary Schools (2-18) II.** Director of Teacher Education in charge  
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.

**304C. Teaching in the Elementary Schools (2-18) III.** Director of Teacher Education in charge  
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.

**\*305A. Teaching in the Middle Grades (5-8) I.** The Staff (Merino in charge)  
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.

**\*305B. Teaching in the Middle Grades (5-8) II.** The Staff (Merino in charge)  
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods in grades 4-9.

**\*305C. Teaching in the Middle Grades (5-8) III.** The Staff (Merino in charge)  
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; accep-

\*Course not offered this academic year.



tance into a teacher education program. Supervised teaching in regular or special education classrooms in junior high school. Current conceptions of the junior high school with emphasis on effective teaching methods, and selection of curriculum materials. Alternative programs.

**306A–306B–306C. Teaching in the Secondary Schools** (2-18) I-II-III. Director of Teacher Education in charge

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.

**307. Methods in Elementary Science** (2) III. Wampler

Lecture/discussion—2 hours. Prerequisite: acceptance into teacher education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.

**308. Methods in Elementary Social Studies** (2) III. Wampler

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.

**309. The Teaching of Mathematics, K–9** (3) I. Dugdale

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.

**\*322. Methods in Secondary Social Studies** (4) I. The Staff (Merino in charge)

Lecture—4 hours. Prerequisite: acceptance into credential program or consent of instructor. Methods and materials of teaching concepts and thinking skills. Recent developments in applying basic skills to the teaching of social studies.

**323A. Physical Science in the Secondary School** (3) I. The Staff (Merino in charge)

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.

**323B. Life Sciences in the Secondary School** (3) II. The Staff (Merino in charge)

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.

**324A. Methods and Technology in Secondary Mathematics I** (4) I. Dugdale, Van Dyne

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.

**324B. Methods and Technology in Secondary Mathematics II** (4) II. Dugdale, Van Dyne

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.

### 325. Research and Methods in Secondary

**English Language Arts** (4) III. The Staff  
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.

**326. Teaching Language Minority Students in Secondary Schools: Methods and Research** (4) II. Merino

Seminar—3 hours; field work—3 hours. Prerequisite: graduate standing in Education or 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.

**\*351. Advanced Fieldwork in Bilingual Education: Teaching** (3-5) I. The Staff (Merino in charge)

Seminar—2 hours; field work—3-9 hours. Prerequisite: acceptance into a bilingual education specialist program. Discussion, analysis, and implementation of methods, techniques, and material in the bilingual/cross-cultural classroom, including team teaching with paraprofessionals, implementation of language-use models in the classroom, lesson planning, selection and use of bilingual/cross-cultural materials.

**\*352. Advanced Fieldwork in Bilingual Education: Evaluation and Supervision** (3-5) II. Merino

Seminar—2 hours; field work—3-9 hours. Prerequisite: upper division standing; acceptance into a bilingual/cross-cultural specialist credential program. Provides opportunity to acquire evaluation and supervisory skills in the field under the supervision of University staff and an experienced program evaluator/supervisor in bilingual/cross-cultural education.

**\*361A-361B-361C. School Psychology:**

**Introduction** (3-3-3) I-II-III. Sandoval and staff  
Seminar—2 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program. History and theory of school psychology. Application of psychological theory to educational problems. Reading and mathematics curriculum for school psychologists. Crisis intervention and counseling in the schools. Fieldwork in schools and other institutions serving children. (S/U grading only.)

**\*362A-362B-362C. School Psychology:**

**Advanced** (3-3-3) I-II-III. Sandoval, Figueroa, Gandara  
Seminar—2 hours; field work—4 hours. Prerequisite: courses 361A-361B-361C, 213, 218, 219. Theory and techniques of school-based mental health consultation and non-biased assessment. Legal principles related to special education practice and school psychology. Advanced case study techniques. (S/U grading only.)

**\*363A-363B-363C. School Psychology:**

**Internship** (8-12) I, II, III. Sandoval, Figueroa, and staff  
Seminar—2 hours; internship—18-32 hours. Prerequisite: admission to school psychology credential program; courses 361A-361B-361C, 362A-362B-362C, 213, 218, 219. Individual assessment and program evaluation, mental health consultation, intervention strategies to promote the school learning and adjustment of children. Selected topics in school psychology. (S/U grading only.)

**398. Group Study** (1-5) I, II, III. The Staff (Director in charge)  
(S/U grading only.)

**399. Individual Study** (1-5) I, II, III. The Staff (Director in charge)  
(S/U grading only.)

## Education (A Graduate Group)

Jonathan H. Sandoval, Chairperson of the Group  
Group Office, 2078 Academic Surge (530-752-0761;  
Fax: 530-752-5411); e-mail: kbray@ucdavis.edu

**Faculty.** Faculty are drawn from 12 departments in the Colleges of Letters and Science, and of Agriculture and Environmental Sciences.

**Graduate Study.** The Graduate Group in Education offers programs of study and research leading to the Ph.D. degree. Students may study topics in mathematics education, science education, and language and literacy education including bilingual education. Students may also concentrate in educational/school psychology, educational anthropology, and educational sociology and policy studies. Detailed information regarding graduate study may be obtained by writing the group administrative assistant.

**Preparation.** Students should have earned an M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the Instructional Studies emphasis in mathematics should have earned the M.A. or M.A.T. degree in mathematics; students applying to the Psychological Studies program should have an M.A. in psychology, or educational psychology.

**Graduate Adviser.** Consult the Education Graduate Group Office.

**Courses.** See Education for courses.

## Education Abroad Program

Dennis Dutschke, Ph.D., E.A.P. Campus Director  
Program Office, 1514 Kerr Hall  
(530-752-3014; Fax: 530-754-8311)

World Wide Web:

<http://www.mrak.ucdavis.edu/provunde/eap/>

### Programs of Study

The University of California offers overseas study programs in cooperation with more than 100 host universities and colleges in over 34 countries throughout the world. More than 1,800 UC students, primarily undergraduates, will take part in this program in 1998-99. Participating students remain registered at their home campuses while studying abroad and receive full academic credit for their work. Nearly 800 international students will attend UC campuses under the auspices of the Education Abroad Program (EAP) in 1998-99, often with scholarships provided through UC and their home institutions. As an academic program, EAP at UC Davis is dedicated to serving students and faculty by providing global educational and internship opportunities.

Full-year study programs are available in Australia, Austria, Barbados, Brazil, Canada, Chile, China, Costa Rica, Denmark, Egypt, England, France, Germany, Ghana, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Mexico, New Zealand, Scotland, Singapore, Spain, Sweden, Taiwan, and Thailand.

EAP also offers short-term and special-focus programs. One-semester options are available in Brazil, Canada, Chile, Costa Rica (quarter also), Denmark, Germany, Hungary, India, Indonesia, Italy, Sweden, and Thailand. One-term intensive language programs are available in Denmark, France, Germany, Italy, and Mexico. A field research program is offered in Mexico, three Tropical Biology programs in Costa Rica, a Global Security and Development Studies and an Engineering spring program in Japan.

UC faculty, who serve as directors at most Study Centers, provide academic advising to students while abroad. Full credit is granted for courses satisfactorily completed, and approved courses are recorded on official UC transcripts. With careful planning, most EAP students make normal progress toward their UC degrees. Students may earn credit abroad towards their major, minor, general education, or graduation requirements, with approval of their UC major and college.

Participants pay the same fees as at UC Davis. Additional costs and fees include room and board, books and personal travel, round-trip transportation, on-site orientation and intensive language program (where applicable) and miscellaneous expenses. The cost of studying abroad is often comparable to that of studying on a UC campus, although costs vary from country to country.

Financial assistance is available to EAP students. Those already receiving UC financial aid maintain their eligibility for grants, loans, and scholarships while studying on EAP. Financial aid is based on the cost of studying at each EAP location. Students who might not normally be eligible for financial aid may qualify for the period they are in EAP. In addition to UC financial aid, EAP provides support through various scholarships and grants. Campus scholarships may also be available based on the country, academic merit, or academic field of study. Students should contact the campus EAP and Financial Aid office for additional information.

An EAP adviser can provide full details about the academic programs abroad, requirements, and application procedures. Staff will put students in touch with recent participants and academic advisers. Academic catalogs and detailed course listings are available.

### Selection

Selection of UC undergraduates is subject to the following minimum qualifications: 3.0 cumulative grade point average at the time of application and maintained through departure (some programs only require "good academic standing," such as the language and culture short-term programs); endorsement of the UC Davis EAP selection committee; and completion of language courses as required. Many countries do not have a language requirement. Only half of the programs require two years of college-level training in the language of the host country.

EAP opportunities are also open to qualified graduate students who have completed at least one full year of graduate work and have support of their graduate program and graduate dean. A detailed statement of the projected program of study is required.

Students are selected by a committee of UC Davis faculty and staff familiar with the host country. EAP applicants must participate in a Conversation/Culture partnership: EAP applicants meet with international students or scholars for a minimum of five hours to exchange language, culture and information about their respective countries before departure. In addition, the committee strongly recommends that prospective participants familiarize themselves with the country of their interest in preparation for the year abroad, through appropriate courses, books, magazine or journal articles, or newspapers. Lists of suggested courses and reading materials are available in the EAP Office.

Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of faculty and EAP returnees. Among other things, academic goals, some knowledge of the host country (and the United States) and proficiency in the language (when applicable), will receive considerable attention during the interviews.

Files of applicants receive the endorsement of the interview committee and the EAP director and are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selection considerations are made.

### Academic Program

In most situations, students from the University of California live as the students of the host country do, and in some cases students attend the same courses, taught by faculty of the host country in their own language. Thus, language skills are very important for about half of the EAP programs. To aid adjustment of UC students, tutorials are a part of the academic program at some centers. Tutorials assist in overcoming language problems and differences in educational practices and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

To assist in the adjustment and the academic work of the students, faculty members of the University of California serve as Directors and/or Associate Directors at most of the study centers abroad.

The academic program of each student includes: (1) an intensive preparatory course in the language of the host country (except for the programs in the Australia, Canada, Egypt, Ghana, Hungary, Ireland, and New Zealand, United Kingdom); (2) a quarter, a semester or a full year of academic courses; (3) broad opportunity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year or 24 semester units in addition to units earned in the intensive language program.

### 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. The provisional planning form in the application packet addresses these concerns.

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. Several major and minor programs have identified key upper division courses which must be completed in residence at Davis. Academic advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy college residence requirements within the final 45 units preceding entrance into the EAP. In addition, subject to prior approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 35 units must be completed in residence in the student's college or university, 12 units of which must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied toward the unit requirement for graduation. The applicant's college dean is the source of information on the university residence requirement.

Students may satisfy GE requirements while on EAP. GE credit is determined by the student's college. Participants 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 Registrar). In some 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 participate in the June commencement ceremony; however, their graduation date will be in September.

## Courses in Education Abroad Program (EAP)

### Lower Division Course

#### 90X. International Education Seminar (1) I, II, III. Dutschke

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.)

### Upper Division Course

#### 190X. International Education Seminar (1) I, II, III. Dutschke

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.)

## Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Each host institution has special areas of excellence and strength. The listing below incorporates selected information concerning course work available at each study center. More detailed information is available in the flyers describing each of the centers and from the EAP advisers in 154 Kerr Hall.

In addition to the programs listed below, Davis students have access to a variety of non-UC programs of study and work abroad opportunities. Information can be obtained at the EAP Office in 154 Kerr Hall.

## Europe

**Denmark.** A compulsory summer intensive language program precedes the academic year or semester and continues through the fall semester. Most students concentrate on their major or a closely related field; independent study under tutorial supervision is expected. Students may also apply to the Summer Intensive Language Program to bring their level of language up to participate in courses taught in Danish during spring semester.

*University of Copenhagen.* Courses in European Studies, political science and law. Other courses: art history, English literature, anthropology, sociology, mathematics and natural sciences. Students may also take a human biology program in English.

**France.** A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at the Bordeaux, Lyon and Paris study centers in France.

A French language and culture Fall quarter program is available at the *Centre International d'Etudes Françaises*, at Lyon.

*Ecole Normale Supérieure*, Paris. Course work in natural sciences, humanities, French and foreign literature, geography, and social sciences.

*Ecole Normale Supérieure at Fontenay-Saint Cloud*, Paris Region. Course work in social sciences and the humanities.

*Ecole Polytechnique at Palaiseau*, Paris Region. Course work in natural sciences and mathematics.

*University of Bordeaux.* Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

*University of Grenoble.* Mainly in the social sciences through the *Université des Sciences Sociales* (Grenoble II); some humanities. Offerings in anthropology and psychology are limited. Not suitable for physical or life sciences.

*University of Lyon.* Social sciences, art history; modern languages and linguistics; Arabic studies.

*Paris Center for Critical Studies.* Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

*Paris Critical Studies Program.* Offers multidisciplinary curriculum in theoretical aspects of the arts, humanities, and social sciences. For advanced undergraduate and graduate students.

*University of Toulouse.* EAP students take regular university courses at Toulouse I (Social Sciences) and Toulouse II (Humanities). Of particular note are courses in business/management studies, comparative literature, economics, international relations, and political science.

**Germany.** A compulsory intensive language and culture program precedes the beginning of the academic year. All courses are taught in German.

*Language and Society Program, Bayreuth.* Short Term program available for Spring quarter.

*Georg-August University, Göttingen.* Year or Spring quarter, or Göttingen Fall and Berlin Spring. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics.

**Hungary.** *Eötvös Loránd University, Budapest.* A fall semester or a year-long program are offered with an emphasis on Central European studies. Students take courses especially designated for EAP, and the courses are taught in English.

**Italy.** A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer intensive-language program in Siena, Italy, in order to attain the second-year level, followed by the normal compulsory intensive-language program at the study center in Italy. A UC faculty director resident in Italy administers the program. All courses are taken in Italian.

*Siena Language and Culture Program.* Spring or fall quarter (Siena) or spring semester. Open to beginning (no prior language study required) and intermediate (at least one year of language study) Italian language students. Sophomores may apply. Good academic standing required.

*Bocconi University, Milan.* Fall semester. This institution offers studies in business administration, with a special emphasis on Italian and European entrepreneurial systems.

*University of Bologna.* Humanities, social sciences, economics, history. Also, literature, art/music performance, communications, European history, film, studio art.

*University of Padua.* History of art (including archaeology), Italian literature/linguistics, and political science, history, social science, geography, and demography. Students may also take performance classes for piano, violin, cello, and voice. The Medical School will open to EAP students in 1998.

*University Institute of Architecture, Venice.* Students may study the scientific aspects of architecture, design, and restoration.

**Spain.** A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

*University of Alcalá de Henares.* Spanish language and literature, history and economics.

*University of Barcelona.* Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. EAP students are required to take at least two regular year-long courses at the University of Barcelona. (This is a cooperative program with the University of Illinois.)

*University of Granada.* EAP students take at least three courses each semester. Students will also take special program tutorials.

*Complutense University of Madrid.* Humanities and some social sciences. The core program, developed for the UC Study Center and other American pro-

grams, concentrates on Spanish studies in the broadest sense. Core and Study Center courses are taught by Spanish faculty. EAP students are required to take two regular year-long courses at the University of Madrid.

*Autonomous University of Barcelona.* Courses in most majors including Catalán studies, International Relations, and Environmental/Ecological studies.

*Autonomous University of Madrid.* Courses in natural sciences, physics, chemistry and biology, economics, history, geography, literature, and psychology.

**Sweden.** Fall term or year participation. Compulsory intensive language course during the summer for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Many courses are taught in English. Previous knowledge of Swedish is not required.

*University of Lund.* Broad curriculum. Excellent science programs.

**United Kingdom and Ireland.** The program, which includes 19 institutions listed below, is administered by a director and associate director located in London. Following selection for participation by the EAP administration, a student must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only.

England: *Bristol University, King's College, Nottingham University, University of Birmingham, University of East Anglia, University of Essex, Colchester, University of Exeter, University of Hull, University of Kent at Canterbury, University of Lancaster, University of Leeds, University of London (Queen Mary and Westfield College), University of Sheffield, University of Sussex, University of Warwick, University of York.*

Ireland: *University College, Cork, University College, Galway.*

Scotland: *University of Edinburgh, University College, Glasgow, University of St. Andrews, University of Stirling.*

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available.

**Russia.** One semester-long (fall only) program available at the *European University of Moscow.* Intensive language study at the intermediate or advanced level for at least half of the units earned, and four core courses in English: Art and History, Politics, Literature, Rise and Fall of Communism in Russia. Some course work will be available in English. Graduate student opportunities will be available for students with advanced Russian language training.

## Middle East

**Egypt.** All courses are taught in English, except courses in Arabic language and literature.

*The American University of Cairo.* A broad curriculum offered by the Faculty of Arts and Sciences. All students are required to take at least one year-long course in Arabic. Offerings in science are limited.

**Israel.** A required, 10-week summer intensive language and cultural immersion program at the University in Haifa or Jerusalem precedes the academic year.

*Hebrew University, Jerusalem.* Broad curriculum; emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English at the Hebrew University's Rothberg School for Overseas Students. The program offers courses in Judaic, Israeli, Middle Eastern studies, and a few courses in the general social sciences and humanities, science and business. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

*Ben-Gurion University of the Negev, Beersheva.* Intensive study abroad experience focusing on research. Two tracks are available: social-scientific study of Israel's ethnic minorities (Bedouin, Russian, Ethiopian) or laboratory study in the health sciences and the nat-

ural sciences in areas related to Israel's environment. Opportunities will be available for students to spend several hours per week in internship positions in various educational, social, community and health institutions in the Bedouin, Ethiopian, Russian and Israeli communities.

## Asia

**Hong Kong.** A selection of courses is offered in English. Knowledge of Chinese is not required for acceptance; however, all students are required to complete at least two courses in Chinese culture, history, or language prior to departure. A compulsory intensive Cantonese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program abroad.

*Chinese University of Hong Kong.* Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available.

*Hong Kong University of Science and Technology.* Fall, spring or year-long options taught in English. Focus on business, engineering or science.

**India.** Fall Semester. Instruction is in English. A compulsory intensive language program in conversational Hindi precedes the academic year. Students can take courses in economics, history, linguistics, philosophy, political science, psychology, social work, and sociology. Limited courses in history of art, conversation, and museology.

*University of Delhi.* Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.

*Jawaharlal Nehru University, New Delhi.* EAP students majoring in economics, development studies, environmental studies, political science, and social sciences will find extensive course work in these areas.

**Indonesia.** Fall semester or year program. Instruction is in English. An eight-week summer intensive-language program at *Gadjah Mada University* in Yogyakarta is required for all students. Those with less than two years of University-level Indonesian must then take a ten-week inter-term program of continued study of the language, with additional courses in Indonesian history and culture, taught in English. Students enroll in regular courses at one of five institutions for the second semester. Tutorial assistance may be available.

*Gadjah Mada University.* Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.

*Institute Seni Indonesia (ISI).* The Indonesian Institute of the Arts: visual arts, music, dance, theater, fine arts, ethno-musicology.

**Japan.** A variety of study opportunities are available to UC students. Language requirements vary depending upon the host institution and the academic focus of the program. A summer intensive language course prepares students for year-long programs. The programs are administered by a director located in Tokyo.

*Doshisha University, Kyoto.* Humanities and social sciences; emphasis on Japanese language and culture. This center serves students having more advanced study of Japanese; at least two, preferably three, years of UC Japanese language study.

*Global Security Studies Program, Meiji Gakuin University, Yokohama.* This spring quarter program provides students the opportunity to study economics, political science, world peace and security issues. Previous Japanese language study is preferred, but not required.

*Inter-University Center for Japanese Language Studies (IUC), Yokohama.* This program offers an intensive program of training for graduate students in Japanese language. The prerequisite is two years of university-level Japanese.

*International Christian University, Mitaka (Tokyo).* Humanities and social sciences; emphasis on Japanese language and intercultural communication. A lim-



ited number of courses taught in English are available. At least one year of university-level Japanese language study is required.

*Nagoya University, Nagoya.* This program is for graduate level economics students. The academic program includes intensive Japanese language study and research conducted under the supervision of a Japanese professor. The prerequisite is two years of university-level Japanese.

*Osaka University, Osaka.* Undergraduate students study Japanese language and a set program of economics courses. Instruction is in English during the fall semester and in Japanese during the spring. A minimum of two years of university-level Japanese is required.

*Sophia University, Tokyo.* Comparative culture studies, Japanese language and literature, history, political science, economics and business are available. Many are taught in English. The prerequisite is one year of university-level Japanese.

*Tohoku University, Sendai.* This program is primarily for graduate students in most fields with well-developed research projects. Participants will study Japanese language, in addition to working on their research projects under the guidance of a Japanese professor. Graduate study in Engineering may also be available. Undergraduates at the advanced level in Japanese may be able to participate in a language and culture program. The prerequisite is two to three years of university-level Japanese.

*Tokyo Institute of Technology.* Graduate students proficient in Japanese may do research and take courses in science and engineering.

*Tsukuba University.* Studies in the humanities, social and natural sciences and engineering.

*University of Tokyo, Komaba campus.*

**Korea.** Year or summer-plus-fall term with a required six-week intensive language program at Yonsei University. Students who are not fluent in Korean will take courses taught in English at Yonsei's Division of International Education. Courses in art history, business, economics, law, literature, philosophy, political science, and sociology are available.

**People's Republic of China.** EAP offers a full-year program in Beijing and a fall semester program at *Beijing Normal University in Beijing*. Intensive language study in Chinese is the primary emphasis of all programs.

*Beijing University of Science and Technology.* Students receive a half-year of academic credit and financial support for studying standard Chinese and teaching English to Chinese students. The prerequisite is two years of Chinese language and one course in teaching English as a foreign language.

*Beijing Normal University in Beijing.* This fall semester program includes Chinese language study and courses taught in English on Chinese culture and civilization. The prerequisite is one year of college-level Chinese. Students must take an intensive language program in July and August prior to the start of the semester.

*Peking University.* A year-long program focused on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisite for the program is two years of college-level Chinese.

**Singapore.** Semester or year program. Courses in biology (botany and zoology), business, economics, sociology, and Southeast Asian Studies.

**Taiwan, Republic of China.** Fall semester or year program. Students who participate in this program will receive Chinese language instruction, special course work in Chinese studies (taught in English) and the opportunity to take regular courses if language requirement is met.

*National Taiwan University.* (This is a cooperative program with California State University International Programs.)

**Thailand.** Fall semester or year program. An eight-week summer intensive language program at *Chiangmai University* is required for all students. This is followed by a seven-week inter-term program of continued study of the Thai language, with additional courses in Thai history and culture, taught in English. Most students will remain at *Chiangmai University* for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient language background (more than two years of University-level Thai language) have the option of enrolling at *Chulalongkorn University* in Bangkok for the second semester. Instruction is in Thai, though English-speaking tutors are available.

It is possible to apply for the summer intensive-language program only. Students may take more advanced language courses in subsequent years.

## Africa

**Ghana.** *University of Ghana, Legon-Accra.* Open to undergraduate and graduate students. Instruction is in English. As in the British system, students take a year-long program of study in a single area. End-of-year examinations are given only once and are mandatory for credit to be awarded.

Offerings include humanities and social sciences, with emphasis on African studies. There is a strong program in ethnomusicology.

## Latin America

**Argentina.** Semester or year-long program. University of Cuyo, Mendoza. Study agriculture, economics, geography, music, political science, and Spanish language and literature.

**Brazil.** Language requirement for admission to this program is two years of college-level Portuguese or the equivalent; or one year of college Spanish and one year of college Portuguese; or two years of college Spanish and intensive language course preceding the beginning of regular course work.

*Pontifical Catholic University of Rio de Janeiro (PUC-Rio).* A semester or year academic program which consists of Portuguese study and regular university courses in a wide range of fields.

**Chile.** Semester (Winter and Spring quarter equivalent) and year program. *Catholic University of Chile, or University of Chile, Santiago de Chile.* A semester or year program is offered. Courses in Chilean history and society; Spanish language; Latin American development, ecology and the environment; and interdisciplinary women's studies are available.

**Costa Rica.** Semester (Winter and Spring quarter equivalent) and year program. *University of Costa Rica, San Jose.* As is appropriate in this hemisphere, the academic year extends from early March through December. UC participants leave in January. Applications for participation in this program are due in May for a January departure.

A mandatory intensive language program precedes the academic year. During the academic year, courses in Central American studies (history, literature, political science, etc.) form half of the curriculum, with the remaining courses taken from any of the faculties at the University of Costa Rica.

*Costa Rica Tropical Biology Quarter at Monteverde and at Las Cruces.* This Spring and Fall quarters program provides an unusual opportunity for undergraduates to study and do field research in a tropical cloud forest. Applicants should have completed a year of biology, including one upper division organismal biology course.

## Central America

**Barbados.** Emphasis in Caribbean studies. Semester or one-year program.

**Mexico.** *Universidad Nacional Autonoma de Mexico (UNAM), Mexico City.* Semester or year. A required intensive language program precedes the beginning of the school year, augmented by courses in contemporary Mexico (history, art, literature, etc.). Students have the option of spending one semester (two UC quarters) at UNAM, or a full year. All instruction is in Spanish.

*Field Research Program (FRP) in Mexico.* Available for either Fall or Spring semester, the FRP program begins in Mexico City with six weeks of intensive language courses and a course on contemporary Mexico. The final weeks of the program are spent doing research work in a city in Mexico to complement formal course work. Students must have completed a minimum of two years of university-level Spanish, or the equivalent, and have at least sophomore standing with good academic standing at the time of departure.

*Language Program in TAXCO.* Winter quarter available for language study at the 2nd-year level or advanced. At least sophomore standing with good academic status at the time of departure.

*Summer Intensive Language Quarter in Morelia.* This program provides total immersion in Mexican society and Spanish language instruction for students who have completed one year of university-level Spanish with a 3.0 GPA before departure. It is not appropriate for advanced students in Spanish. At least sophomore standing with a cumulative GPA of at least 3.0.

## Canada

Students may enroll for a Fall semester or a full year. Studies on the major or a closely allied field are expected.

*University of British Columbia (UBC), Vancouver.* Most academic disciplines are available. Areas of special interest include Pacific Rim and Canadian Studies.

## Australia and New Zealand

As is appropriate in the Southern Hemisphere, the academic year extends from the beginning of instruction in late February through the examination period, which ends in early December. UC participants leave in early February, and will be unable to attend classes during the winter term preceding departure. Applications for participation in these programs are due in May for a February departure. The universities follow the British system of higher education.

The Australian program includes the *University of Queensland* in Brisbane; the *Australian National University* in Canberra; three institutions in the Melbourne area, *University of Melbourne, Monash University* and *La Trobe University*; the *University of Sydney*, and the *University of New South Wales* in Sydney; University of Western Australia; *Australian National University* in Canberra. *University of Adelaide* and *Flinders University* in Adelaide; and the *University of Wollongong*. A full range of academic programs is available. The Study Center accommodates a limited number of students. A UC faculty member in Melbourne directs all programs.

The New Zealand program includes the *University of Auckland, University of Canterbury, Christchurch; Lincoln University of Canterbury; the University of Otago* in Dunedin, *Massey University* in Palmerston North, *Victoria University* in Wellington and the *University of Waikato* in Hamilton. All academic disciplines are available; programs in textiles and engineering and a variety of agricultural sciences are of special interest.



## Endocrinology (A Graduate Group)

Judith Turgeon, Ph.D., Chairperson of the Group  
Group Office, 4136 Tupper Hall (Human Physiology,  
752-3230)

**Faculty.** The Group includes faculty from the Schools of Medicine and Veterinary Medicine, the Division of Biological Sciences, and the College of Agricultural and Environmental Sciences.

### Courses in Endocrinology (EDO)

#### Graduate Courses

**\*210. Methods in Endocrine Research** (4) I, II, III. The Staff

Laboratory—9 hours; discussion—1 hour. Prerequisite: consent of instructor. Ten-week assignment in endocrinology research laboratory. Individual research problem with emphasis on experimental design and methodological/analytical experience. Exposure to and experience with a range of endocrinology faculty research activities. May be repeated three times for credit. (S/U grading only.)

#### 218. Mammalian Endocrinology and Homeostasis

(4) III. Turgeon, Walsh  
Lecture—4 hours. Prerequisite: Biological Sciences 102 and 103, Neurobiology, Physiology and Behavior 101, and consent of instructor. Biochemical, physiological, and regulatory properties of the mammalian endocrine system, at the molecular, cellular and systemic level. Signal transduction mechanisms and hormonal actions. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolism and minerals, fluids and electrolytes. Reproductive endocrinology.

#### 220. Endocrinology Literature Critique

(1) I, II. Turgeon  
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.)

#### 235. Personal Computing in the Life Sciences

(3) III. Matthews  
Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Current and near-future uses of "state-of-the-art" personal computers, including the Internet and local area networks. Application in the life sciences. Running programs on Macintosh and PC-compatible computers and on Windows NT local area network in Endocrinology Graduate Group computer laboratory.

**240. Biochemical Endocrinology** (3) III. Adams  
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.

#### 290. Seminar

(1) I, II, III. The Staff (Chairperson in charge)  
Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
(S/U grading only.)

## Endocrinology and Metabolism

See **Internal Medicine in Medicine, School of**

## Engineering

(College of Engineering)

Alan J. Laub, Ph.D., Dean

Benjamin J. McCoy, Ph.D., Associate Dean—  
Research

Zuhair A. Munir, Ph.D., Associate Dean—Graduate  
Studies

James F. Shackelford, Ph.D., Associate Dean—  
Undergraduate Studies

Billy Sanders, Ph.D., Assistant Dean—Academic  
Affairs

College Office, 1050 Engineering II (530-752-0553)  
World Wide Web: <http://www.engr.ucdavis.edu/>

### Undergraduate Study

The four-year undergraduate program is divided into two parts: the **Lower Division Program** and the **Upper Division Program**. If you enter the College of Engineering with *fewer than 90* quarter units of credit, follow the lower division program specified for your major.

If you enter the College with 90 or more quarter units of credit, you must fulfill the requirements outlined in the Undergraduate Education chapter of this catalog, under "College of Engineering, Unit Requirements."

### Graduate Study

Graduate degrees are offered in Engineering (M.Engr, M.S., D.Engr., Ph.D.) and Engineering—Applied Science (M.S., Ph.D.). For additional information refer to the *College of Engineering Bulletin*, obtainable from the UCD Bookstore, or phone the Graduate Study Office (530-752-0592). See also the Graduate Studies chapter of this catalog.

### The Major Programs

Eleven majors are offered leading to the B.S. degree:

**Aeronautical Science and Engineering**  
**Biological Systems Engineering**  
**Chemical Engineering**  
**Chemical/Biochemical Engineering**  
**Civil Engineering**  
**Computer Engineering**  
**Computer Science and Engineering**  
**Electrical Engineering**  
**Food Engineering**  
**Materials Science and Engineering**  
**Mechanical Engineering**

Four double majors are offered leading to the B.S. degree:

**Chemical Engineering/Materials Science and Engineering**  
**Civil Engineering/Materials Science and Engineering**  
**Electrical Engineering/Materials Science and Engineering**  
**Mechanical Engineering/Materials Science and Engineering**

### The Aeronautical Science and Engineering Major Program

(Mechanical and Aeronautical Engineering)

Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture and operation of aircraft. Our

Bachelor of Science degree in Aeronautical 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 you for employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sports equipment, and a variety of energy systems.

Courses in fundamental engineering principles are supplemented with courses in aircraft propulsion, aerodynamics, performance, stability and control, aircraft preliminary design, aeronautical structures, and aeroelasticity.

### Aeronautical Science and Engineering Curriculum

*The Aeronautical Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.*

#### Lower Division Program

|                                                                                                                                                                                                                   | UNITS     | QUARTER<br>USUALLY<br>TAKEN |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------|
| <b>Required Courses</b>                                                                                                                                                                                           |           |                             |
| Calculus—Mathematics<br>21A-21B-21C-21D .....                                                                                                                                                                     | 16        | 1-2-3-4                     |
| Linear algebra—<br>Mathematics 22A .....                                                                                                                                                                          | 3         | 5                           |
| Differential equations—<br>Mathematics 22B .....                                                                                                                                                                  | 3         | 6                           |
| General physics—Physics<br>9A-9B-9C-9D .....                                                                                                                                                                      | 16        | 3-4-5-6                     |
| General chemistry—Chemistry 2A-2B<br>or 2AH-2BH .....                                                                                                                                                             | 10        | 2-3 or 4-5                  |
| Engineering graphics in design—<br>Engineering 4 .....                                                                                                                                                            | 3         | 1 or 2                      |
| Applications of computers—<br>Engineering 5 .....                                                                                                                                                                 | 3         | 2 or 5                      |
| Circuits—Engineering 17 .....                                                                                                                                                                                     | 4         | 6                           |
| Aeronautical engineering fundamentals—<br>Aeronautical Science and<br>Engineering 25 .....                                                                                                                        | 3         | 2 or 5                      |
| Statics—Engineering 35 .....                                                                                                                                                                                      | 3         | 4 or 5                      |
| Properties of materials—<br>Engineering 45 .....                                                                                                                                                                  | 4         | 4 or 6                      |
| Expository writing—English 1 or 3,<br>or Comparative Literature<br>1, 2, 3 or 4, or Native American<br>Studies 5 .....                                                                                            | 4         | 1 or 2                      |
| Introduction to public speaking or<br>group communication—<br>Communication 1 or 3 (or an<br>acceptable substitute as approved<br>by the Undergraduate Study<br>Committee of the College of<br>Engineering) ..... | 4         | 4                           |
| Humanities—Social Sciences and/or<br>General Education electives .....                                                                                                                                            | 15        |                             |
| <b>Total Lower Division Units .....</b>                                                                                                                                                                           | <b>91</b> |                             |

#### Upper Division Program

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 aeronautical science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, aeroelasticity, flight testing, or component and mechanism design. While you should consult with your adviser before selecting your technical electives, there are a number of electives that could be recommended to all aeronautical science

and engineering students regardless of their chosen area of specialization.

Suggested technical electives:

Aeronautical Science and Engineering 131, 137, 139  
Mechanical Engineering 172

**Suggested advisers:** J.J. Chattot, M.M. Hafez, R.A. Hess, L.W. Rehfield, N. Sarigul-Klijn, S.A. Snell, C.P. van Dam, B.R. White.

**Upper Division Requirements**

| Subject Areas and Courses                                                                                                                                                                                                                                    | UNITS      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Electronic circuits—Engineering 100 .....                                                                                                                                                                                                                    | 3          |
| Applied mechanics—Engineering 102, 104, 104L .....                                                                                                                                                                                                           | 9          |
| Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165 .....                                                                                                                                                                              | 10         |
| Fluid mechanics—Engineering 103A, 103B, 107 .....                                                                                                                                                                                                            | 9          |
| Aerodynamics—Aeronautical Science and Engineering 126, 127 .....                                                                                                                                                                                             | 8          |
| Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 138 .....                                                                                                                                             | 12         |
| Aircraft preliminary design—Aeronautical Science and Engineering 130 .....                                                                                                                                                                                   | 4          |
| Aerospace structures—Aeronautical Science and Engineering 133, 135 .....                                                                                                                                                                                     | 7          |
| Measurement systems—Mechanical Engineering 176 .....                                                                                                                                                                                                         | 3          |
| Controls and system analysis—Mechanical Engineering 171 .....                                                                                                                                                                                                | 4          |
| Applied mathematics—Select one course from Engineering 180, Applied Science Engineering 115 or Mathematics 128C .....                                                                                                                                        | 3          |
| Professional responsibilities—Engineering 190 .....                                                                                                                                                                                                          | 3          |
| Technical electives .....                                                                                                                                                                                                                                    | 8          |
| Select 8 units from the following:                                                                                                                                                                                                                           |            |
| <i>Strongly recommended:</i> Aeronautical Science and Engineering 131, 137, 139; Mechanical Engineering 172.                                                                                                                                                 |            |
| <i>Recommended:</i> Engineering 106, 122, Materials Science and Engineering 140, 142, 148, 155, Mechanical Engineering 150A, 150B, 162, 184A with 184B (both courses must be taken), 186, 187, Applied Science 115, Civil and Environmental Engineering 130. |            |
| Humanities—Social Sciences electives and/or General Education electives .....                                                                                                                                                                                | 9          |
| <b>Total Upper Division Units .....</b>                                                                                                                                                                                                                      | <b>92</b>  |
| <b>Minimum Units Required for Major .....</b>                                                                                                                                                                                                                | <b>183</b> |

**Biological Systems Engineering**

(Biological and Agricultural Engineering)

Biological Systems Engineering is the branch of engineering that builds strongly on biology as a scientific base. In the coming age of biology and biotechnology, engineers will be needed to work side by side with life scientists to bring laboratory developments into commercial production. Industries in plant and animal production, tissue culture, bioprocessing, biotechnology, food processing, aquaculture, agriculture, and forest production will all need engineers with strong training in biology. Concern for our environment is opening new 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 usual in all engineering programs, including mathematics, physics, chemistry, engineering science, and humanities. Unlike other majors, the Biological Systems Engineering major also requires fundamental courses in the biological sciences and the integration of engineering with biology.

**Biological Systems Engineering Curriculum**

*The Biological Systems Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.*

**Lower Division Program**

| Required Courses                                                                                                                                                                               | UNITS        | QUARTER USUALLY TAKEN |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------|
| Calculus—Mathematics 21A-21B-21C-21D .....                                                                                                                                                     | 16           | 1-2-3-4               |
| Linear algebra—Mathematics 22A .....                                                                                                                                                           | 3            | 5                     |
| Differential equations—Mathematics 22B .....                                                                                                                                                   | 3            | 6                     |
| General physics—Physics 9A-9B-9C .....                                                                                                                                                         | 12           | 3-4-5                 |
| General chemistry—Chemistry 2A-2B .....                                                                                                                                                        | 10           | 2-3                   |
| Biological Sciences 1A, 1B, 1C .....                                                                                                                                                           | 15           | 4-5-6                 |
| Introduction to biological systems and food engineering—Biological Systems Engineering 1 .....                                                                                                 | 3            | 1                     |
| Biosystems engineering graphics design laboratory—Biological Systems Engineering 2L .....                                                                                                      | 1            | 1                     |
| Applications of computers—Engineering 5 or Introduction to programming—Computer Science Engineering 30 .....                                                                                   | 3 or 4       | 2                     |
| Circuits—Engineering 17 .....                                                                                                                                                                  | 4            | 6                     |
| Statics—Engineering 35 .....                                                                                                                                                                   | 3            | 4                     |
| Properties of biological materials—Biological Systems Engineering 75 .....                                                                                                                     | 4            | 5                     |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 .....                                                                                 | 4            | 1                     |
| Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering) ..... | 4            | 2                     |
| Humanities—Social Sciences electives and General Education electives .....                                                                                                                     | 8            | 3, 6                  |
| <b>Total Lower Division Units .....</b>                                                                                                                                                        | <b>93-94</b> |                       |

**Upper Division Program**

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 six specializations:

- Agricultural Engineering
- Aquacultural Engineering
- Biotechnical Engineering
- Ecological Systems Engineering
- Forest Engineering
- Premedical/Biomedical 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 engineering analysis and design with applied biology to solve problems in production, transportation and processing of agricultural products. Agricultural engineers design machinery, processes, and systems for managing a productive plant and animal culture, including environment, nutrient, and waste. 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 large and small agricultural producers, equip-

ment manufacturers, food processors, consulting engineering firms, and government agencies.

Recommended biological science electives:

*Plant Emphasis*  
Plant Biology 111  
Soil Science 100

Select one course from Agricultural Systems and Environment 110A, Entomology 100, Plant Biology 174, 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, 132, 145  
Civil and Environmental Engineering 141, 141L  
Engineering 180

**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, especially processes related to water quality, to be able to work with the wide variety of systems used for aquaculture production. Systems range from sophisticated indoor plants with water treatment and recirculation to low-input earthen ponds. The recommended electives include fish biology and production as well as water quality and treatment. 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:

Applied Biological Systems Technology 161  
Animal Science 118  
Wildlife, Fish and Conservation Biology 121

Recommended engineering electives:

Applied Biological Systems Technology 163  
Civil and Environmental Engineering 140, 140L, 141, 141L, 148A, 148B

**Biotechnical Engineering.** This specialization is for students interested in the developing 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 emerging 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

Recommended engineering electives:

Biological Systems Engineering 132, 175  
Chemical Engineering 161B, 161L  
Engineering 180

**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 wildland resource management.

\*Course not offered this academic year.

Recommended biological science electives:

- Entomology 100
- Environmental Science and Policy 100
- Soil Science 100
- Select one course from Atmospheric Science 133, Plant Biology 121, Environmental Toxicology 101 or 112A

Recommended engineering electives:

- Applied Biological Systems Technology 180
- Biological Systems Engineering 115, 135, 145
- Civil and Environmental Engineering 148A or 149, 152
- Hydrologic Sciences 100

Recommended course:

- Landscape Architecture 40 (no technical elective credit will be granted for this course in any engineering major)

**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 noneconomic objectives such as retaining biodiversity. Forest engineers help to develop the equipment and techniques to plan and carry out forest operations that can meet these changing requirements. Examples include reforestation, harvesting, forest residue management, and development of roads and recreation facilities.

Following the sophomore year, students are strongly encouraged to attend an eight-week field course sequence at the UC Forestry Camp near Quincy. This is followed by a semester at UC Berkeley, as an inter-campus visitor, taking suggested forestry courses. This sequence provides a strong background in 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:

- ESPM 129\* 3 (Forest and Range Soils) or Soil Science 100
- ESPM 182\* 4.5 (Forest Harvest Systems)
- ESPM 185\* 6 (Silviculture)

Recommended engineering electives:

- Applied Biological Systems Technology 180
- Biological Systems Engineering 114, 115, 116
- Civil and Environmental Engineering 141, 141L, 145

Recommended Courses:

- ESPM 101\* 15 (Forestry Summer Program)
- ESPM 172\* 4.5 (Forest Photogrammetry and Photo Interpretation) or Geography 106
- ESPM 175\* 4 (Forest Influences)
- Plant Biology 120

\*ESPM courses are offered at UC Berkeley campus.

**Pre-Medical/Biomedical Engineering.** The pre-medical/biomedical specialization is for students planning to attend medical school after graduation or to work in the biomedical industries. Course work in biology, chemistry, organic chemistry, biochemistry, microbiology, and physiology satisfies typical entrance requirements for medical school. Early in their academic programs, pre-medical engineering students should consult with an adviser from the School of Medicine to plan for successful admission, including appropriate summer experience. Biomedical engineering is primarily a field of study at the graduate level, and may have a chemical, mechanical, or electrical emphasis. The core Biological Systems Engineering program—plus additional course work in fluid mechanics, rheology, and dynamics—provides a broad foundation for graduate specialization.

Recommended biological science electives—Biomedical:

- Biological Sciences 102
- Microbiology 102
- Neurobiology, Physiology and Behavior 101

Recommended biological science electives—Premedical:

- Biological Sciences 101, 102
- Microbiology 150, 150L

Recommended engineering electives:

- Biological Systems Engineering 175
- Engineering 102, 102L, 103B, 103L, 180

Recommended for medical school:

- Chemistry 2C, 118C

Upper Division Requirements

UNITS

Subject Areas and Courses

- Probabilistic systems analysis for civil engineers—Civil and Environmental Engineering 114 .....3
- Organic chemistry—Chemistry 8A or 118A...2-4
- Organic chemistry—Chemistry 8B or 118B (recommended for Aquacultural, Biotechnical, and Pre-Medical/Biomedical Engineering specializations) or Surveying—Civil and Environmental Engineering 10 (recommended for Agricultural, Ecological, and Forest Engineering specializations).....4 or 3
- Dynamics—Engineering 102.....4
- Electrical circuits and systems—Engineering 100 .....3
- Elementary fluid mechanics—Engineering 103A .....3
- Mechanics of materials—Engineering 104 (recommended for Agricultural, Pre-Medical/Biomedical, Ecological, and Forest Engineering specializations) or Chemical Engineering 161A (recommended for Aquacultural and Biotechnical Engineering specializations) .....3-4
- Thermodynamics—Engineering 105A .....3
- Engineering economics—Engineering 106...3
- Power sources and transmission—Biological Systems Engineering 120 or Unit Operations in Biological and Food Engineering—Biological Systems Engineering 132.....4
- Psychrometrics, heat and mass transfer—Biological Systems Engineering 125.....4
- Dynamic modeling of processes in biological systems—Biological Systems Engineering 130 .....4
- Bioinstrumentation and control—Biological Systems Engineering 165 .....4
- Engineering design and professional responsibilities—Biological Systems Engineering 170A .....3
- Engineering projects: Design—Biological Systems Engineering 170B .....2
- Engineering projects: Design Laboratory—Biological Systems Engineering 170BL ...1
- Engineering projects: Design Evaluation—Biological Systems Engineering 170C .....1
- Engineering projects: Design Evaluation Laboratory—Biological Systems Engineering 170CL.....2
- Engineering electives†—Select a minimum of 10 units (to bring the overall total to at least 180 units) from all upper division College of Engineering courses (exclusive of Applied Science Engineering 137, Engineering 160, and courses numbered 190–197); Applied Biological Systems Technology 163, 180; and Hydrologic Science 100. A maximum of 4 units of Biological Systems Engineering 199 may be offered in satisfaction of the Engineering electives requirement.....10
- Biological science electives†—Select a minimum of 9 units from all upper division courses in the Division of Biological Sciences (excluding courses numbered 190–199); Applied Biological Systems Technology 161, Animal Science 118, 143, 144, 146; Agricultural Systems and Environment 110A; Atmospheric Science 133; Avian Sciences 100; Entomology 100; Environmental Horticulture 102; ESPM 129,

- 182, 185 (ESPM courses are offered at UC Berkeley campus); Environmental Science and Policy 100; Environmental Toxicology 101, 112A; Plant Biology 174; Soil Science 100; Wildlife, Fish and Conservation Biology 121. Students may choose other upper division courses with substantial biological content offered in the College of Agricultural and Environmental Sciences; consultation with a faculty adviser and approval by petition is required .....9
- Humanities—Social Science electives and/or General Education electives .....16

**Total Upper Division Units.....87-91**

**Minimum Units Required for Major .....180-185**

†Refer to specialization descriptions for course recommendations.

Master Undergraduate Adviser: M. Delwiche.

Chemical Engineering

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from antibiotics to zirconium. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment, food and pharmaceutical production, and medicine, working in areas as diverse as integrated circuits and 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 treating not only current technical problems but also those that will arise in the technologies of the future.

Chemical Engineering Curriculum

The Chemical Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

Lower Division Program

Requirements for majors in Chemical Engineering and the double majors, Chemical Engineering/Materials Science and Engineering and Chemical Engineering/Biochemical Engineering.

|                                                                                               | UNITS | QUARTER USUALLY TAKEN |
|-----------------------------------------------------------------------------------------------|-------|-----------------------|
| <b>Required Courses</b>                                                                       |       |                       |
| Calculus—Mathematics 21A-21B-21C-21D.....16                                                   |       | 1-2-3-4               |
| Linear algebra—Mathematics 22A...3                                                            |       | 5                     |
| Differential equations—Mathematics 22B .....3                                                 |       | 6                     |
| General physics—Physics 9A-9B-9C .....12                                                      |       | 3-4-5                 |
| General chemistry—Chemistry 2A, 2B, 2C (Chemistry 2AH, 2BH, 2CH strongly recommended) .....15 |       | 1-2-3                 |
| Organic chemistry—Chemistry 128A, 128B.....6                                                  |       | 4-5                   |
| Organic chemistry laboratory—Chemistry 129A.....2                                             |       | 4                     |
| Biological Sciences 1A.....5                                                                  |       | 6                     |
| (required only for Chemical/Biochemical majors)                                               |       |                       |
| Engineering—Applications of computers—Engineering 5 .....3                                    |       | 2 or 5                |
| Circuits—Engineering 17.....4                                                                 |       | 6                     |
| Statics—Engineering 35.....3                                                                  |       | 5                     |



## 220 Engineering

|                                                                                                                                                                                                |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Properties of materials—Engineering 45 (required only for Materials Science and Chemical Engineering/Materials Science and Engineering majors).....0 or 4                                      | 6      |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5...4                                                                                    | 2 or 3 |
| Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering).....4 | 2 or 3 |
| Humanities—Social Sciences electives and/or General Education electives .....                                                                                                                  | 16     |
| <b>Total Lower Division Units.....91-96</b>                                                                                                                                                    |        |

### Upper Division Program

In your junior year, you focus on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In your senior year, you draw these fundamentals together and apply them in a study of mass transfer phenomena, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 6 units of advanced chemistry electives that allow you to strengthen specific areas in chemical engineering, explore new areas, or pursue areas of specialization. The most popular areas of specialization, together with lists of **suggested** technical electives, are identified and discussed in the following paragraphs. Please talk to the instructors of the courses listed about possible prerequisites before enrolling.

The *premedical* and *prebiomedical engineering* areas of specialization have been specifically designed to prepare the student for graduate work in biomedical engineering or to meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and the application of fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics to problems in natural science, you are well prepared to understand problems in living systems. Many biological phenomena, such as blood flow, solute transport, and energy exchange, can be dealt with using the theoretical tools you learned as an undergraduate.

### Areas of Specialization

**Applied Chemistry.** The Chemical Engineering curriculum includes an important core of chemistry courses. You can take advantage of this background to build a strong program in chemistry by choosing electives from among advanced undergraduate chemistry courses.

Suggested technical electives:

Chemistry 110B, 111, 115, 121, 128C, 129B, 129C, 130, 131, 150  
Fiber and Polymer Science 100, 110

**Applied Mathematics.** The mathematics specialization strengthens your understanding of the foundations of engineering science and improves your ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:

Applied Science Engineering 115, 116  
Mathematics 118A, 118B, 118C, 119A, 119B, 121A, 121B, 128A, 128B, 128C, 131, 132A, 132B, 185A, 185B

**Biochemical Engineering.** This area of specialization prepares you to do graduate work in biochemical engineering and to find employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:

*Strongly recommended*

Microbiology 102, 102L  
Biological Sciences 1A, 102  
Chemical Engineering 161A, 161B, 161L

*Also recommended*

Biological Sciences 1B, 101, 103, 104  
Biological Systems Engineering 175  
Chemical Engineering 170  
Food Science and Technology 123, 123L  
Microbiology 140, 150, 155L, 160  
Molecular and Cellular Biology 120L, 123, 160L, 161, 170L  
Neurobiology, Physiology and Behavior 100B, 100L  
Plant Science 140  
Viticulture and Enology 140, 186

**Computers and Automation.** This specialization offers you the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, you are exposed to the theory and practice of monitoring and operating chemical processes using microprocessor-based control systems. The common ingredient in these studies is the use of computers. Development of expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yields, solving large numbers of equations on supercomputers to assess transient behavior of processes, and implementation of plantwide control systems are all examples of chemical engineering endeavors based on the extensive use of computers. The suggested elective courses help you obtain the necessary background in these areas.

Suggested technical electives:

Artificial Intelligence and Computer Graphics:

Computer Science Engineering 170, 175

Numerical Analysis and Optimization:

Applied Science Engineering 115, 116

Mathematics 128B-128C, 168

Civil and Environmental Engineering 153

Automatic Control:

Biological Systems Engineering 165

Electrical and Computer Engineering 150B, 157B, 174

Mechanical Engineering 176

Food Science and Technology 156

**Advanced Materials Processing.** Because the manufacture of semiconductor devices, integrated circuits, magnetic memories, tapes, disks, and other devices involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces you to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of such devices.

Suggested technical electives:

Electrical and Computer Engineering 140A, 140B, 145A, 145B, 146A, 146B

Physics 140A, 140B

Materials Science and Engineering 138, 144, 146, 155

**Energy Conversion and Fuels Processing.** This area of specialization introduces you to energy sources, energy conversion methods, and the manufacture of fuels.

Suggested technical electives:

Biological Systems Engineering 120  
Engineering 111

Environmental and Resource Sciences 103

Environmental Science and Policy 167

Mechanical Engineering 161, 162

**Environmental Engineering.** Many activities of chemical engineers are motivated by environmental protection. This option prepares you to deal with environmental issues by developing knowledge of fundamental chemical and transport phenomena: chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses and courses on environmental topics, prepares you to

seek employment with industry or government. For this specialization, select six courses from the following list:

Suggested technical electives:

**Air Environment**

*Strongly recommended*

Civil and Environmental Engineering 149

*Recommended*

Atmospheric Science 121A, 121B, 158

Civil and Environmental Engineering 150

Environmental Science and Policy 110

Environmental Toxicology 101, 112A, 112B, 131

**Water Environment**

*Strongly recommended*

Chemical Engineering 161A, 161B, 161L

Civil and Environmental Engineering 140, 140L, 148A, 148B

Microbiology 102

*Recommended*

Biological Sciences 102, 103

Civil and Environmental Engineering 147

Environmental Science and Policy 110, 150A, 151

Environmental Toxicology 101, 112A, 112B

Hydrologic Science 124

Soil Science 100, 102, 107

**Food Process Engineering.** This area of specialization prepares you to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:

*Strongly recommended*

Microbiology 102

Biological Sciences 102, 103, 104

Chemical Engineering 161A, 161B, 161L

Biological Systems Engineering 132

Food Science and Technology 100A, 104, 104L

*Recommended*

Food Science and Technology 150, 150L, 151

**Marketing.** Specialty chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in market planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:

Management 250, 251

Agricultural and Resource Economics 113, 130, 136

Statistics 103

**Polymer Science.** Polymer materials and their applications are dependent on the use of chemical and engineering principles to process such materials to meet the end-use functional and environmental requirements. The polymer science specialization also prepares you for graduate work in the interdisciplinary field of polymer science and engineering.

Suggested technical electives:

Chemistry 108, 128C, 129B, 129C

Fiber and Polymer Science 100, 150

Chemical Engineering 150C

Materials Science and Engineering 147

**Prebiomedical Engineering.** This area of specialization prepares you for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to schedule necessary Biological Sciences courses into your program.

Suggested technical electives:

Four to six courses from

Anatomy, Physiology and Cell Biology 100, Bio-

logical Sciences 1A, 1B, 1C, 101, 102, 103,

104, Molecular and Cellular Biology 140L, 141,

142, Neurobiology, Physiology and Behavior

101, 111A, 111B, 112, 113, 114

**Premedical.** Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. If you elect the premedical (including preveterinary)



area of specialization, you should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on your electives. To ensure that you have provided room in your program for the necessary biology courses, prepare a course schedule with a Chemical Engineering adviser early in your freshman year.

Suggested technical electives:

- Anatomy, Physiology and Cell Biology 100
- Chemistry 128C, 129B, 129C
- Six biology or biochemistry courses, such as
  - Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, Microbiology 102, Molecular and Cellular Biology 140L, 141, 142, 150, Neurobiology, Physiology and Behavior 101, 112, 113, 114

**Chemical Engineering  
Upper Division Requirements**

UNITS

**Subject Areas and Courses**

- Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 157L, 158A, 158B, 158C, 159 .....61
- Chemistry—Chemistry 110A, 110C .....6
- Quantum mechanics—Physics 9D or Chemistry 110B .....4 or 3
- Advanced chemistry electives .....6
  - Select from upper division courses in Chemistry; Biological Sciences 101, 102, 103; Chemical Engineering 150C, 161A, 161B, 161L, 166, 170; Civil and Environmental Engineering 140, 140L; Materials Science Engineering 134, 144, 147; Environmental Toxicology 112A-112B; Food Science and Technology 100A-100B, 104, 119; Molecular and Cellular Biology 120L, 123, 126; Plant Biology 160; Fiber and Polymer Science 150.
- Technical electives .....12
- Humanities—Social Sciences/General Education electives .....8

**Total Upper Division Units.....96-97  
Minimum Units Required for Major .....187-188**

**Chemical Engineering/Materials Science and Engineering Upper Division Requirements**

UNITS

**Subject Areas and Courses**

- Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 157L, 158A, 158B, 158C, 159 .....61
- Chemistry—Chemistry 110A, 110C .....6
- Quantum mechanics—Physics 9D or Chemistry 110B .....4 or 3
- Materials science—Materials Science and Engineering 130, 132, 134, 138, and two courses chosen from Materials Science and Engineering 140, 142, 144, 146, 147, 148, 149, 155, and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, and 138L.....22
- Humanities—Social Sciences and/or General Education electives .....8

**Total Upper Division Units.....100-101  
Minimum Units Required for Major .....195-196**

**Chemical Engineering/Biochemical Engineering Upper Division Requirements**

UNITS

**Subject Areas and Courses**

- Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 155A, 156A, 157, 157L, 158A, 158C, 159, 161C .....51
- Biochemical engineering—Biological Sciences 102, Microbiology 102, Chemical Engineering 161A, 161B, 161L .....17
- Chemistry—Chemistry 110A, 110C .....6

Biochemical Engineering electives .....10  
Choose two laboratory courses from the laboratory electives list and choose additional courses from the lecture elective list to provided at least 10 units total.

*Laboratory elective list:*

Food Science and Technology 123L, Microbiology 102L, 177L, Molecular and Cellular Biology 120L (this course counts as two laboratory courses and completely satisfies the laboratory requirement), 160L, Neurobiology, Physiology and Behavior 104L, Plant Biology 153, 161A, 161B, 192/199 (Students may replace one laboratory course with a laboratory internship (192) or independent study (199) with approval of the chairperson).

*Lecture elective list:*

Biological Sciences 1B, 101, 103, 104, Biological Systems Engineering 175, Chemical Engineering 170, Food Science and Technology 123, Microbiology 140, 150, 177, Molecular and Cellular Biology 123, Neurobiology, Physiology and Behavior 103, Plant Biology 111, 112, 152, Viticulture and Enology 140, 186.

Humanities—Social Sciences electives and/or General Education electives .....8

**Total Upper Division Units .....92  
Minimum Units Required for Major.....188**

**Civil and Environmental Engineering**

(Civil and Environmental Engineering)

Civil and environmental engineering is devoted to the improvement of the human environment to make our activities productive, safe, and enjoyable, and our surroundings aesthetically pleasing. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; management and control of waste streams; land-water-air transportation; housing and other structures; flood control; and large recreational facilities.

**Civil Engineering Curriculum**

*The Civil Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.*

**Lower Division Program**

*Requirements for Civil Engineering and the double major, Civil Engineering/Materials Science and Engineering.*

|       | QUARTER<br>USUALLY<br>TAKEN |
|-------|-----------------------------|
| UNITS |                             |

**Required Courses**

- Calculus—Mathematics 21A-21B-21C-21D .....16 1-2-3-4
- Linear algebra—Mathematics 22A...3 5
- Differential equations—Mathematics 22B .....3 6
- General physics—Physics 9A-9B-9C-9D .....16 3-4-5-6  
(Students majoring in Civil Engineering or Civil Engineering/Materials Science and Engineering are required to complete 12 units of physics including Physics 9A, 9B and 9C. In addition, either Physics 9D, Chemistry 2C or 2CH, Biological Science 1A or Geology 50-50L is required.)
- General chemistry—Chemistry 2A-2B or 2AH-2BH .....10 2-3 or 4-5
- Introduction to Civil and Environmental Engineering systems—Civil and Environmental Engineering 3 .....3 1 or 2  
(Civil and Environmental Engineering 3 is designed for freshman students. More

- advanced students may petition to substitute 3 units of technical electives for Civil and Environmental Engineering 3.)
  - Engineering graphics in design—Engineering 4 .....3 1 or 2
  - Applications of computers—Engineering 5 .....3 4
  - Introduction to Surveying—Civil and Environmental Engineering 10 ...3 3 or 6
  - Circuits—Engineering 17 .....4 6
  - Statics—Engineering 35 .....3 5
  - Properties of materials—Engineering 45 .....4 5
  - Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5.....4 1 or 2
  - Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering) .....4 6
  - Humanities—Social Sciences electives and/or General Education electives .....12
- Total Lower Division Units.....91**

**Upper Division Program**

Areas of specialization within civil and environmental engineering include (1) Civil Engineering Planning; (2) Environmental Engineering; (3) Structural Engineering, Structural Mechanics, and Geotechnical Engineering; (4) Transportation Planning and Engineering; and (5) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives. Such specialization is not required. You are urged to consult an adviser when developing your individual program.

Because of the direct concern of professional civil engineers for the quality of human life, you are encouraged to consider among your technical electives, courses such as Economics 125, Environmental Science and Policy 160 and 166; Political Science 108. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

**Areas of Specialization**

**Civil Engineering Planning.** This specialization focuses on the planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with course work in the humanities and social sciences.

- Suggested technical electives:
- Agricultural and Resource Economics 147, 148, 175, 176
  - Civil and Environmental Engineering 137, 146, 147, 153, 155, 160, 161, 162
  - Economics 100, 125, 130, 131
  - Engineering 160 (only one unit of credit towards Technical Elective requirement), Environmental Science and Policy 160, 161, 166, 167, 168A, 168B, 171, 173, 179
  - Geography 155, 162
  - Geology 134
  - Hydrologic Science 150, 186
  - Political Science 100, 101, 102, 107, 108
- Suggested advisers: J.R. Lund, P. Mokhtarian, D. Sperling.

**Environmental Engineering.** Specialists in this area are concerned with improving and maintaining the qualities of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is firmly based on fundamental science and civil engineering and emphasizes the design of water-

borne, solid, and airborne waste management systems; the design of potable water-supply systems; and environmental monitoring.

Suggested technical electives:

- Applied Science Engineering 116
- Atmospheric Science 120, 121A, 121B, 158
- Biological Sciences 102, 103
- Chemical Engineering 154A, 154B, 156A, 156B, 161A, 161B, 170
- Chemistry 107A, 107B, 110A, 128A, 128B
- Civil and Environmental Engineering 140, 140L, 142, 143, 144, 145, 146, 147, 148B, 149, 150
- Engineering 180
- Environmental Science and Policy 150A, 150B, 150C, 151, 166
- Mathematics 128A, 128B, 128C
- Mechanical Engineering 161
- Microbiology 102, 105, 130A
- Soil Science 111
- Statistics 130A, 130B

Suggested advisers: D.P.Y. Chang, J. Darby, T. Ginn, S.G. Schladow, E.D. Schroeder, G. Tchobanoglous, T.M. Young.

**Structural Engineering, Structural Mechanics, and Geotechnical Engineering.** This area is concerned with the conception, design, analysis, economics, and construction of structures such as buildings, bridges, highways, and dams. Structural Engineering encompasses structures made from metals, reinforced concrete, or timber. Geotechnical Engineering encompasses natural and man-made structures, such as foundations or slopes that are composed of rock or soil. Structural mechanics emphasizes more theoretical aspects of structures, such as mathematical analysis and characterization of material properties.

Suggested technical electives:

- Aeronautical Science and Engineering 133, 135, 137
- Civil and Environmental Engineering 130, 131, 132, 134, 136, 137, 138, 173, 174, 176
- Engineering 122, 180
- Materials Science and Engineering 138
- Mathematics 128A, 128B, 128C

Suggested advisers: K. Arulanandan, J. Bolander, R. Boulanger, R. Chai, Y.F. Dafalias, L.R. Herrmann, I.M. Idriss, B. Kutter, G.H. Paulino, M.R. Ramey, M.M. Rashid, K.M. Romstad.

**Transportation Planning and Engineering.** Specialists in this area are concerned with the development, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning blends knowledge of the basic concepts of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. Students should also acquire an awareness of the social sciences and environmental sciences through course work in these areas.

Suggested technical electives:

- Civil and Environmental Engineering 137, 149, 153, 160, 161, 162
- Engineering 160 (only one unit of credit towards Technical Electives requirement)
- Environmental Science and Policy 167, 168A, 168B, 171, 173, 178, 179

Suggested advisers: P. Mokhtarian, D. Niemeier, D. Sperling.

**Water Resources Engineering.** This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is the study of flow in pipe and open-channel water-distribution systems and through hydraulic structures. Water resources system planning and design is concerned with the comprehensive development of water resources for multiple use. This specialization emphasizes principles of planning, analysis, and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:

- Agricultural and Resource Economics 148, 176
  - Atmospheric Science 120, 121A, 121B
  - Civil and Environmental Engineering 142, 144, 145, 146, 148B, 153, 155
  - Electrical and Computer Engineering 150A, 150B
  - Environmental Science and Policy 128, 150A, 151
  - Geography 162
  - Hydrologic Science 110, 150
- Suggested advisers: T. Ginn, M.L. Kavvas, I.P. King, B.E. Larock, J.R. Lund, M.A. Mariño, S.G. Schladow.

**Civil Engineering  
Upper Division Requirements**

|                                                                                                                                                                                                                                                      |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                                                                                                                                                                                                                                                      | UNITS      |
| <b>Subject Areas and Courses</b>                                                                                                                                                                                                                     |            |
| Dynamics—Engineering 102.....                                                                                                                                                                                                                        | 4          |
| Fluid Mechanics—Engineering 103A.....                                                                                                                                                                                                                | 3          |
| Structural mechanics—Engineering 104, 104L.....                                                                                                                                                                                                      | 5          |
| Applied thermodynamics—Engineering 105A or Chemistry 110A.....                                                                                                                                                                                       | 3          |
| Soil mechanics—Civil and Environmental Engineering 171,† 171L.....                                                                                                                                                                                   | 5          |
| Hydraulics and water resources—Civil and Environmental Engineering 141, 141L.....                                                                                                                                                                    | 4          |
| Environmental—Civil and Environmental Engineering 148A.....                                                                                                                                                                                          | 3          |
| Civil engineering design—Civil and Environmental Engineering 135.....                                                                                                                                                                                | 4          |
| One course from Civil and Environmental Engineering 134, 136, 145, 148B, 162, or 173; and three or four additional courses from Civil and Environmental Engineering 132, 134, 136, 145, 147, 148B, 150, 155, 162, or 173.....                        | 15         |
| Economics—Engineering 106.....                                                                                                                                                                                                                       | 3          |
| Engineering mathematical analysis—Applied Science Engineering 115, Civil and Environmental Engineering 114, and one course from Applied Science Engineering 116, Civil and Environmental Engineering 153, Mathematics 118A, 121A, Statistics 108...9 | 9          |
| Transportation electives—select from Civil and Environmental Engineering 160 or 161.....                                                                                                                                                             | 3          |
| Technical electives.....                                                                                                                                                                                                                             | 16         |
| Twelve units must be selected from upper division engineering courses; of these units, six units must be selected from Civil and Environmental Engineering courses other than Civil and Environmental Engineering 192 or 199.                        |            |
| Humanities—Social Sciences electives and/or General Education electives.....                                                                                                                                                                         | 12         |
| <b>Total Upper Division Units.....</b>                                                                                                                                                                                                               | <b>89</b>  |
| <b>Minimum Units Required for Major.....</b>                                                                                                                                                                                                         | <b>180</b> |

**Civil Engineering/Materials Science and Engineering Upper Division Requirements**

|                                                                                                                                                                                                                |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
|                                                                                                                                                                                                                | UNITS |
| <b>Subject Areas and Courses</b>                                                                                                                                                                               |       |
| Electronic circuits—Engineering 100.....                                                                                                                                                                       | 3     |
| Dynamics—Engineering 102.....                                                                                                                                                                                  | 4     |
| Fluid Mechanics—Engineering 103A.....                                                                                                                                                                          | 3     |
| Structural mechanics—Engineering 104, 104L.....                                                                                                                                                                | 5     |
| Applied thermodynamics—Engineering 105A or Chemistry 110A; Materials Science Engineering 130.....                                                                                                              | 6     |
| Structural analysis—Civil and Environmental Engineering 130.....                                                                                                                                               | 4     |
| Soil mechanics—Civil and Environmental Engineering 171,† 171L.....                                                                                                                                             | 5     |
| Hydraulics and water resources—Civil and Environmental Engineering 141, 141L.....                                                                                                                              | 4     |
| Environmental—Civil and Environmental Engineering 148A.....                                                                                                                                                    | 3     |
| Civil engineering design—Civil and Environmental Engineering 135; one course from Civil and Environmental Engineering 134, 136, 145, 148B, 162, or 173; and two additional courses chosen from Civil and Envi- | 13    |

ronmental Engineering 132, 134, 136, 145, 147, 148B, 150, 155, 162, or 173.....

Economics—Engineering 106.....3

Engineering mathematical analysis—Applied Science Engineering 115, Civil and Environmental Engineering 114, and one course from Applied Science Engineering 116, Civil and Environmental Engineering 153, Mathematics 118A, 121A, Statistics 108...9

Materials science—Materials Science and Engineering 132, 134, 138, and two courses from Materials Science and Engineering 140, 142, 144, 147 148, 149, 155; and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L.....19

Humanities—Social Sciences electives and/or General Education electives.....12

(Civil and Environmental Engineering 137 recommended.)

**Total Upper Division Units.....93**  
**Minimum Units Required for Major.....184**

†Civil Engineering 10 is a required prerequisite to Civil Engineering 171.

**Computer Science and Engineering**

(Computer Science and Engineering)

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" in this catalog.

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 which form the focus of the curriculum.

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 on the Internet at <www.cs.ucdavis.edu/instruction/announcements.html#master>.

**Computer Science and Engineering Curriculum**

*The Computer Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology and the Computer Science Accreditation Commission of the Computing Science Accreditation Board.*

**Lower Division Program**

|                                              | UNITS | QUARTER<br>USUALLY<br>TAKEN |
|----------------------------------------------|-------|-----------------------------|
| <b>Required Courses</b>                      |       |                             |
| Calculus—Mathematics 21A, 21B, 21C, 21D..... | 16    | 1-2-3-4                     |
| Linear algebra—Mathematics 22A...3           | 3     | 5                           |
| Differential equations—Mathematics 22B.....  | 3     | 6                           |
| General physics—Physics 9A, 9B, 9C, 9D.....  | 16    | 3-4-5-6                     |

\*Course not offered this academic year.

|                                                                                                                                                                                                |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| General chemistry—Chemistry 2A....5                                                                                                                                                            | 1 or 2     |
| Discrete mathematics for computer science—Computer Science Engineering 20.....4                                                                                                                | 4          |
| Introductory programming—Computer Science Engineering 30 or 35....4                                                                                                                            | 1 or 2     |
| Software development—Computer Science Engineering 40.....4                                                                                                                                     | 2 or 3     |
| Computer structure and assembly language—Computer Science Engineering 50 or Electrical and Computer Engineering 70....4                                                                        | 3, 4 or 5  |
| Circuits—Engineering 17.....4                                                                                                                                                                  | 6          |
| Statics—Engineering 35.....3                                                                                                                                                                   | 4 or 5     |
| Properties of materials—Engineering 45.....4                                                                                                                                                   | 4 or 5     |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5....4                                                                                   | 1 or 2     |
| Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering).....4 | 4, 5, or 6 |
| Humanities—Social Sciences and/or General Education Electives ....12                                                                                                                           |            |
| <b>Total Lower Division Units.....90</b>                                                                                                                                                       |            |

**Upper Division Program**

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 humanities and social science 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 post-graduate study.

**Upper Division Requirements**

UNITS

**Subject Area and Courses**

|                                                                                                                                                                                                                                                                                                                                                                                     |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Professional responsibilities—Computer Science Engineering 188 or Engineering 190.....3                                                                                                                                                                                                                                                                                             |  |
| Electrical engineering background—Electrical and Computer Engineering 100 and 180A.....10                                                                                                                                                                                                                                                                                           |  |
| Mathematical methods—Mathematics 131 or Statistics 131A.....4                                                                                                                                                                                                                                                                                                                       |  |
| Data structures and algorithms—Computer Science Engineering 110.....4                                                                                                                                                                                                                                                                                                               |  |
| Computer science theory—Computer Science Engineering 120† or 122A†.....4                                                                                                                                                                                                                                                                                                            |  |
| Computer hardware—Computer Science Engineering 152A, 154A, 154B, and Electrical and Computer Engineering 172.....15                                                                                                                                                                                                                                                                 |  |
| Computer software—Computer Science Engineering 140A, 150‡ or 151A‡, and 160...12                                                                                                                                                                                                                                                                                                    |  |
| Computer electives—at least 16 units chosen from Computer Science Engineering 120†, 122A†, 122B, 140B, 142, 150‡, 151A‡, 151B, 152B, 153, 158, 163, 165A, 165B, 168, 170, 172, 175, 177, 178, or Electrical and Computer Engineering 180B, and a combined maximum of 3 units from approved Computer Science Engineering 192, 199 and Electrical and Computer Engineering 194.....16 |  |

|                                                               |  |
|---------------------------------------------------------------|--|
| Humanities—Social Sciences/General Education electives.....21 |  |
| Unrestricted elective.....1                                   |  |
| <b>Total Upper Division Units.....90</b>                      |  |
| <b>Minimum Units Required for Major.....180</b>               |  |

† Completion of both Computer Science Engineering 120 and 122A will satisfy the computer science theory requirement and a computer elective requirement.

‡ Completion of both Computer Science Engineering 150 and 151A will satisfy a portion of the computer software operative system requirement and a computer elective requirement.

**Electrical and Computer Engineering**

(Electrical and Computer Engineering)

The Department of Electrical and Computer Engineering administers three curricula in the College of Engineering: (1) the Electrical Engineering curriculum, (2) the Computer Engineering curriculum, and (3) the Electrical Engineering/Materials Science curriculum.

The Integrated Degree Program (IDP) leads to both the bachelor's 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, or Electrical Engineering/Materials Science curricula. Applicants in their junior year must apply for IDP by March 31. Further information on IDP is listed in the *College of Engineering Bulletin*.

*The Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science and Engineering curricula are all accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.*

**Electrical Engineering Curriculum**

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.

**Lower Division Program**

*Requirements for Electrical Engineering and Electrical Engineering/Materials Science and Engineering majors.*

|                                                                                                             | QUARTER | USUALLY |
|-------------------------------------------------------------------------------------------------------------|---------|---------|
|                                                                                                             | UNITS   | TAKEN   |
| <b>Required Courses</b>                                                                                     |         |         |
| Calculus—Mathematics 21A, 21B, 21C, 21D.....16                                                              | 1-2-3-4 | 5       |
| Linear algebra—Mathematics 22A...3                                                                          |         | 6       |
| Differential equations—Mathematics 22B.....3                                                                |         | 2       |
| General physics—Physics 9A, 9B, 9C, 9D.....16                                                               | 3-4-5-6 | 2       |
| General chemistry—Chemistry 2A....5                                                                         |         | 1       |
| Introductory programming—Computer Science Engineering 30 or 35.....4                                        |         | 2       |
| Engineering problem solving—Engineering 6.....4                                                             |         | 3       |
| Object-oriented programming—Computer Science Engineering 40 or Electrical and Computer Engineering 73.....4 |         |         |

|                                                                                                                                                                                                |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Computer structure and assembly language—Electrical and Computer Engineering 70 or Computer Science Engineering 50.....4                                                                       | 4 |
| Circuits—Engineering 17.....4                                                                                                                                                                  | 6 |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5....4                                                                                   | 1 |
| Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering).....4 | 5 |
| Humanities—Social Sciences and/or General Education electives ....12                                                                                                                           |   |
| Unrestricted Electives.....7                                                                                                                                                                   |   |
| <b>Total Lower Division Units.....90</b>                                                                                                                                                       |   |

**Upper Division Programs**

Upper division requirements for the degrees in Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science are described below.

**Electrical Engineering Curriculum**

The Electrical Engineering curriculum prepares students for careers in electrical engineering or for graduate studies by providing a solid background in mathematics, physical sciences, and traditional electrical engineering subjects of (1) physical electronics, (2) electromagnetics, (3) analog electronics, (4) digital electronics, and (5) signal processing and communication. Through the proper choice of 29 units of flexible design, technical, and unrestricted electives, you may focus on any of these four specialty areas or distribute the 29 units of electives among these areas.

**Areas of Specialization**

**Physical Electronics** includes the areas of solid-state circuits and fabrication, and the theory courses supporting those subjects.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B

Design electives: Electrical and Computer Engineering 110B, 118, 135, 146A, 146B, 218A

Technical electives: Electrical and Computer Engineering 112, 114, 145A, 145B, 148, 150B, 240

Suggested advisers: R.W. Bower, J.P. Collinge, C.E. Hunt, R.L. Smith.

**Electromagnetics** involves microwave circuits and fiber optical systems.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B

Design electives: Electrical and Computer Engineering 110B, 132A, 132B, 132C, 135

Technical electives: Electrical and Computer Engineering 112, 131A, 131B, 131C, 145A, 145B, 148, 150B, 195A-195B-195C

Suggested advisers: G.R. Branner, A.J. Dienes, J.P. Heritage, O. Solgaard.

**Analog electronics** involves the transistor-level analog circuit design, including electronic amplifiers, analog-to-digital converters, communication circuits, and filters.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 140B, 150B

Design electives: Electrical and Computer Engineering 110B, 112, 114, 118, 160 or 195A-195B-195C, 210

Technical electives: Electrical and Computer Engineering 130B and 146A, or 157A or 194A-194B-194C or 146B or 218A



## 224 Engineering

Suggested advisers: K.W. Current, P.J. Hurst, S.H. Lewis, R.R. Spencer.

**Digital electronics** involves transistor-level design of digital circuits, including logic gates, RAM and ROM, and programmable logic arrays.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 140B, 150B

Design electives: Electrical and Computer Engineering 110B, 114 or 194A-194B-194C or 195A-195B-195C; 118, 170, 180B, 218A

Technical electives: Electrical and Computer Engineering 130B and 146A, or 112 or 146B or 157A or 160 or 210

### Signal Processing and Communications

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 150B

Design electives: Electrical and Computer Engineering 106, 110B, 157A or 160; 157B or 112; 174, 180B

Technical electives: Electrical and Computer Engineering 114, 135, 140B, 166, 167, 172, 194A-194B-194C, 195A-195B-195C

Suggested advisers: K.A. Abdel-Ghaffar, T.S. Chang, K. Feher, G.E. Ford, B. Friedlander, W.A. Gardner, A.N. Gündes, T.C. Hsia, T.R. Reed, M.A. Soderstrand, S. Wang.

### Electrical Engineering Upper Division Requirements

UNITS

#### Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 180A, plus two courses from 110B†, 130B, 140B, 150B.....34

Probability theory—Statistics 120, 131A, or Mathematics 131.....4

Professional responsibilities—Engineering 160, 190 or Applied Science Engineering 137 or Computer Science Engineering 188.....3

Design electives.....18

Select six courses, at least two with laboratories, from:

Electrical and Computer Engineering 106, 110B†, 112, 114, 118, 132A, 132B, 132C, 135, 146A, 146B, 157A, 157B, 160, 166, 170,‡ 172, 174, 180B, 194A-194B-194C (must be taken together to count as one design elective), 195A-195B-195C (must be taken together to count as one design elective);  
Computer Science Engineering 110, 122B, 140A, 140B, 142, 150, 151A, 151B, 153, 158, 160, 163, 165A, 165B, 168, 175, 177.

May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.

Technical electives—Select courses from the College of Engineering Technical Electives list, plus Engineering 35 and 45, with at least 4 units from courses in Electrical and Computer Engineering.....11

Humanities—Social Sciences/General Education electives.....12

Unrestricted electives.....8

**Total Upper Division Units.....90**

**Minimum Units Required for Major.....180**

† Electrical and Computer Engineering 110B may not be counted toward both the Electrical Engineering Core requirement and the Electrical Engineering Design Electives.

‡ Electrical Engineering students may substitute Computer Science Engineering 154B for Electrical and Computer Engineering 170.

### Computer Engineering Curriculum

The program in Computer Engineering provides the student with a broad and well-integrated background in the concepts and methodologies that are needed for the analysis, design, development, organization, theory, programming, and applications of information processing systems. Although such systems are popularly called "computers," they involve a far wider range of disciplines than merely computation, and the Computer Engineering curriculum is correspondingly broad. The program presents the essential material in electronic circuits, digital logic, discrete mathematics, computer programming, data structures, and other topics. Students who complete the Computer Engineering curriculum receive a Bachelor of Science in Computer Engineering.

### Lower Division Program

|                                                                                                                                                                                                                  | QUARTER<br>USUALLY<br>UNITS | TAKEN   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------|
| <b>Required Courses</b>                                                                                                                                                                                          |                             |         |
| Calculus—Mathematics 21A, 21B, 21C, 21D.....                                                                                                                                                                     | 16                          | 1-2-3-4 |
| Linear algebra—Mathematics 22A...3                                                                                                                                                                               | 3                           | 5       |
| Differential equations—<br>Mathematics 22B.....                                                                                                                                                                  | 3                           | 6       |
| General physics—Physics 9A, 9B, 9C, 9D.....                                                                                                                                                                      | 16                          | 3-4-5-6 |
| General chemistry—Chemistry 2A...5                                                                                                                                                                               | 5                           | 2       |
| Introductory programming—<br>Computer Science<br>Engineering 30 or 35.....                                                                                                                                       | 4                           | 1       |
| Object-oriented programming—<br>Computer Science<br>Engineering 40.....                                                                                                                                          | 4                           | 2       |
| Engineering problem<br>solving—Engineering 6.....                                                                                                                                                                | 4                           | 3       |
| Computer structure and assembly<br>language—Electrical and<br>Computer Engineering 70 or<br>Computer Science<br>Engineering 50.....                                                                              | 4                           | 4       |
| Discrete mathematics—Computer<br>Science Engineering 20.....                                                                                                                                                     | 4                           | 5       |
| Circuits—Engineering 17.....                                                                                                                                                                                     | 4                           | 6       |
| Expository writing—English 1 or 3, or<br>Comparative Literature 1, 2, 3 or 4,<br>or Native American Studies 5.....                                                                                               | 4                           | 1       |
| Introduction to public speaking or<br>group communication—<br>Communication 1 or 3 (or an<br>acceptable substitute as<br>approved by the Undergraduate<br>Study Committee of the College<br>of Engineering)..... | 4                           | 6       |
| Humanities—Social Sciences<br>and/or General Education<br>electives.....                                                                                                                                         | 12                          |         |
| Unrestricted Electives.....                                                                                                                                                                                      | 3                           |         |
| <b>Total Lower Division Units.....</b>                                                                                                                                                                           | <b>90</b>                   |         |

### Upper Division Program

The Computer Engineering curriculum prepares students for careers in computer engineering or for graduate studies by providing a solid background in mathematics, physical sciences, and the traditional computer engineering subjects: electronics, computer hardware, and computer software. Here electronics refers to the five Electrical Engineering specialty areas: (1) physical electronics, (2) electromagnetics, (3) analog electronics, (4) digital electronics, and (5) signal processing and communication. The 63 upper division units in electronics, computer hardware and computer software consist of 13 units in electronics courses, 18 units in computer hardware courses, and 12 units in computer software courses. The remaining 20 units consist of 9 units of design electives and 11 units of technical electives. By carefully selecting these 20 design and technical electives, students can focus on electronics, computer hardware, or computer software, or can distribute these units among the three areas.

### Areas of Specialization

**Computer Systems and Software** involves computer architecture, computer design, computer interfacing, and computer software.

Recommended elective courses:

Design electives: Computer Science and Engineering 140A, 142, 160

Technical electives: Electrical and Computer Engineering 106, 150B, 174, 194A-194B-194C, 195A-195B-195C, Computer Science and Engineering 122B, 140B, 152A, 152B, 153, 158, 163, 165A, 165B, 168, 175, 177

Suggested advisers: V. Akella, S. Bakshi, V.G. Oklobdzija, G.R. Redinbo, M.A. Soderstrand, K.D. Wilken.

**Logic Design** involves the design of computer circuits at various levels, including the use of CAD systems, VHDL, and the design and fabrication of transistor-level digital circuits.

Recommended elective courses:

Design electives: Electrical and Computer Engineering 110B, 112, 118

Technical electives: Electrical and Computer Engineering 140A, 174, 194A-194B-194C, 195A-195B-195C, 218A

Suggested advisers: V. Akella, S. Bakshi, V.G. Oklobdzija, G.R. Redinbo, M.A. Soderstrand, K.D. Wilken.

### Computer Engineering Upper Division Requirements

UNITS

#### Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 140A, 180A, 180B.....23

Computer hardware—Electrical and Computer Engineering 170\*, 172.....8

Computer software—Computer Science Engineering 150 or 151A.....4

Data structures and algorithms—Computer Science Engineering 110, 122A.....8

Probability theory—Statistics 120, 131A, or Mathematics 131.....4

Professional responsibilities—Engineering 160, 190, Applied Science Engineering 137, or Computer Science Engineering 188.....3

Design electives.....9

Select three courses from:

Electrical and Computer Engineering 106, 110B, 112, 114, 118, 132A, 132B, 132C, 135, 146A, 146B, 157A, 157B, 160, 166, 174, 194A-194B-194C (taken together may count as one design elective), 195A-195B-195C (must be taken together to count as one design elective);  
Computer Science Engineering 122B, 140A, 140B, 142, 151B, 153, 158, 160, 163, 165A, 165B, 168, 175, 177.

May also include approved Electrical and Computer Engineering or Computer Science Engineering 192 or 199 courses.

Technical electives—select courses from the College of Engineering Technical Electives list, plus Engineering 35 and 45, with at least 4 units from courses in Electrical and Computer Engineering.....11

Humanities/Social Sciences/General Education electives.....12

Unrestricted electives.....8

**Total Upper Division Units.....90**

**Minimum Units Required for Major.....180**

\* Computer Science Engineering 154B may be substituted for the Electrical and Computer Engineering 170 requirement.



**Electrical Engineering/Materials Science and Engineering Curriculum**

The Electrical Engineering/Materials Science curriculum 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, optoelectronics, 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 curriculum provides students with the background necessary to pursue careers in electrical engineering or materials science or to go on to graduate study. Students who complete the Electrical Engineering/Materials Science curriculum will receive a Bachelor of Science in Electrical Engineering/Materials Science.

**Lower Division Program**

|                                                                                                                                                                                                    | QUARTER<br>USUALLY<br>UNITS | TAKEN   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------|
| <b>Required Courses</b>                                                                                                                                                                            |                             |         |
| Calculus—Mathematics 21A, 21B, 21C, 21D .....                                                                                                                                                      | 16                          | 1-2-3-4 |
| Linear algebra—Mathematics 22A...3                                                                                                                                                                 | 3                           | 5       |
| Differential equations—<br>Mathematics 22B .....                                                                                                                                                   | 3                           | 6       |
| General physics—Physics 9A, 9B, 9C, 9D .....                                                                                                                                                       | 16                          | 3-4-5-6 |
| General chemistry—Chemistry 2A, 2B .....                                                                                                                                                           | 10                          | 2-3     |
| Introductory programming—<br>Computer Science Engineering 30 or 35 .....                                                                                                                           | 4                           | 1       |
| Engineering problem solving—<br>Engineering 6 .....                                                                                                                                                | 4                           | 2       |
| Object-oriented programming—<br>Computer Science Engineering 40 or Electrical and Computer Engineering 73 .....                                                                                    | 4                           | 3       |
| Computer structure and assembly language—Electrical and Computer Engineering 70 or Computer Science Engineering 50 .....                                                                           | 4                           | 4       |
| Properties of materials—<br>Engineering 45 .....                                                                                                                                                   | 4                           | 5       |
| Circuits—Engineering 17 .....                                                                                                                                                                      | 4                           | 6       |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5....4                                                                                       | 4                           | 1       |
| Introduction to public speaking or group communication—<br>Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering) ..... | 4                           | 4       |
| Humanities/Social Sciences and/or General Education electives ....12                                                                                                                               | 12                          |         |
| <b>Total Lower Division Units .....</b>                                                                                                                                                            | <b>92</b>                   |         |

**Electrical Engineering/Materials Science and Engineering Upper Division Requirements**

|                                                                                                                                                                 | UNITS |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Required Courses</b>                                                                                                                                         |       |
| Electrical engineering core—Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 150A, 180A...38                                        | 38    |
| Materials science core—Materials Science and Engineering 130, 132, 134, 146, and one laboratory course from Materials Science and Engineering 132L, 134L.....14 | 14    |
| Engineering science—Engineering 104, 105A .....                                                                                                                 | 7     |
| Probability theory—Statistics 120, 131A, or Mathematics 131 .....                                                                                               | 4     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Professional responsibilities—Engineering 160, 190, Applied Science Engineering 137, or Computer Science Engineering 188 .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3         |
| Design electives .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6         |
| Select two courses, at least one of which must be a Materials Science and Engineering course, from the following:<br>Electrical and Computer Engineering 106, 112, 114, 118, 132A, 132B, 132C, 135, 146B, 157A, 157B, 160, 166, 170, 172, 173, 174, 180B, 194A-194B-194C (taken together may count as one design elective), 195A-195B-195C (must be taken together to count as one design elective); Computer Science Engineering 110, 122B, 140A, 140B, 142, 150, 151A, 151B, 153, 154B, 158, 160, 163, 165A, 165B, 168, 175, 177.<br>Materials Science and Engineering 140, 142, 148, 155.<br>May also include approved Electrical and Computer Engineering, Computer Science and Engineering, or Materials Science Engineering 199 courses. |           |
| Laboratory courses—Materials Science and Engineering 149, Electrical and Computer Engineering 146A.....6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6         |
| Advanced science electives—Geology 161, 162N; or Physics 140A and 140B; or Physics 121 and 122; or Chemistry 110A and 110C.....6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 6         |
| Humanities—Social Sciences and/or General Education electives .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12        |
| <b>Total Upper Division Units.....</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>96</b> |

**Minimum Units Required for Major.....188**

**Food Engineering**

(Biological and Agricultural Engineering)

There is a strong demand for food engineering graduates in the food industry, which is the largest industrial sector of the U.S. and California economies. Food engineers help develop new food products and conceive, design and operate food processes, equipment and plants for effective production of foods with minimal impact on the environment. Food engineers may work for food companies in process research and development, equipment and facilities design, or management of production operations. Research and regulatory positions are also available with state and federal agencies. Summer internships are usually available, and students are encouraged to make use of these opportunities.

Food engineering involves the application of engineering principles and concepts to the handling, storage, processing, packaging, and distribution of food and related products. In addition to engineering principles, the food engineering degree provides an understanding of the chemical, biochemical, microbiological, and physical characteristics of foods. Concepts of food refrigeration, freezing, extrusion, drying, packaging, handling, and other food operations are studied.

The food engineering curriculum provides a strong foundation in mathematical, physical, biological, and food sciences, with courses from the biological and food sciences, and from biological systems, chemical, and mechanical engineering. These courses introduce students to methods that account for material and energy uses; methods for analyzing and designing processes, equipment and operations (e.g. fluid flow and heat transfer); and methods for predicting, monitoring and controlling performance of operations in a manner most relevant to food and food systems.

Food engineers are key contributors in optimizing food quality and safety, and in maintaining high nutritional standards. In the development of food products like low-fat foods, food engineers design the processes and equipment to manufacture the new food and assist in the food formulation.

**Food Engineering Curriculum**

**Lower Division Program**

|                                                                                                                                                                                                    | UNITS        | QUARTER<br>USUALLY<br>TAKEN |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------|
| <b>Required Courses</b>                                                                                                                                                                            |              |                             |
| Calculus—Mathematics 21A-21B-21C-21D .....                                                                                                                                                         | 16           | 1-2-3-4                     |
| Linear algebra—Mathematics 22A...3                                                                                                                                                                 | 3            | 5                           |
| Differential equations—<br>Mathematics 22B .....                                                                                                                                                   | 3            | 6                           |
| General physics—<br>Physics 9A-9B-9C .....                                                                                                                                                         | 12           | 3-4-5                       |
| General chemistry—<br>Chemistry 2A-2B .....                                                                                                                                                        | 10           | 2-3                         |
| Organic chemistry—<br>Chemistry 8A-8B .....                                                                                                                                                        | 6            | 4-5                         |
| Biological Sciences 1A.....5                                                                                                                                                                       | 5            | 4                           |
| Introduction to biological systems and food engineering—<br>Biological Systems Engineering 1 .....                                                                                                 | 3            | 1                           |
| Biosystems engineering graphics design laboratory—Biological Systems Engineering 2L .....                                                                                                          | 1            | 1                           |
| Applications of computers—<br>Engineering 5 or Introduction to programming—Computer Science Engineering 30 .....                                                                                   | 3 or 4       | 2                           |
| Circuits—Engineering 17 .....                                                                                                                                                                      | 4            | 6                           |
| Statics—Engineering 35 .....                                                                                                                                                                       | 3            | 6                           |
| Properties of biological materials—<br>Biological Systems Engineering 75 .....                                                                                                                     | 4            | 5                           |
| Expository writing—English 1 or 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5....4                                                                                      | 4            | 1                           |
| Introduction to public speaking or group communication—<br>Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering) ..... | 4            | 2                           |
| Humanities—Social Sciences electives and General Education electives .....                                                                                                                         | 8            | 3, 6                        |
| <b>Total Lower Division Units.....</b>                                                                                                                                                             | <b>89-90</b> |                             |

**Upper Division Program**

In the junior and senior years, the major requires courses that focus on the integration of biological and food science with engineering.

**Upper Division Requirements**

|                                                                                                  | UNITS |
|--------------------------------------------------------------------------------------------------|-------|
| <b>Subject Areas and Courses</b>                                                                 |       |
| Applied statistics in agricultural science—<br>Agricultural Systems and Environment 120 .....    | 4     |
| Psychrometrics, heat and mass transfer—<br>Biological Systems Engineering 125 .....              | 4     |
| Bioinstrumentation and control—<br>Biological Systems Engineering 165 .....                      | 4     |
| Elementary fluid mechanics—<br>Engineering 103A .....                                            | 3     |
| Process dynamics and control—<br>Chemical Engineering 157 .....                                  | 3     |
| Chemical engineering analysis—<br>Chemical Engineering 159 .....                                 | 3     |
| Dynamics—<br>Engineering 102 .....                                                               | 4     |
| Electrical circuits and systems—<br>Engineering 100 .....                                        | 3     |
| Mechanics of materials—<br>Engineering 104 .....                                                 | 4     |
| Thermodynamics—<br>Engineering 105A, 105B .....                                                  | 6     |
| Engineering economics—<br>Engineering 106 .....                                                  | 3     |
| Structure and function of biomolecules—<br>Biological Sciences 102 .....                         | 3     |
| Dynamic modeling of processes in biological systems—<br>Biological Systems Engineering 130 ..... | 4     |

## 226 Engineering

|                                                                                                                                                                                                                                                                                           |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Unit operations in biological and food engineering—Biological Systems Engineering 132 .....                                                                                                                                                                                               | 4  |
| Engineering design and professional responsibilities—Biological Systems Engineering 170A .....                                                                                                                                                                                            | 3  |
| Engineering projects: Design—Biological Systems Engineering 170B .....                                                                                                                                                                                                                    | 2  |
| Engineering projects: Design Laboratory—Biological Systems Engineering 170BL .....                                                                                                                                                                                                        | 1  |
| Engineering projects: Design Evaluation—Biological Systems Engineering 170C .....                                                                                                                                                                                                         | 1  |
| Engineering projects: Design Evaluation—Biological Systems Engineering 170CL .....                                                                                                                                                                                                        | 2  |
| Rheology of biological materials—Biological Systems Engineering 175 .....                                                                                                                                                                                                                 | 3  |
| Food microbiology—Food Science and Technology 104 .....                                                                                                                                                                                                                                   | 3  |
| Food packaging—Food Science and Technology 131 .....                                                                                                                                                                                                                                      | 3  |
| Biological science electives—Select a minimum of 5 units from the following courses: Biological Sciences 101, 103; Environmental Science and Policy 110; Environmental Toxicology 101, 131; Food Science and Technology 100A, 104L, 119, 120, 121, 128, 151; Plant Biology 152, 172 ..... | 5  |
| Humanities—Social Science electives and/or General Education electives .....                                                                                                                                                                                                              | 16 |

**Total Upper Division Units .....**91

**Minimum Units Required for Major .....**180-181

**Master Undergraduate Adviser:** T. Rumsey.

### Materials Science and Engineering

(Chemical and Materials Science Engineering)

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, alloys, 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 fabrication of steel to 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 program in Materials Science and Engineering provides the background for activities in research, processing, and the design of materials. A common core of courses basic to engineering are taken during your first two years and provide a strong foundation in fundamental engineering concepts.

#### Materials Science Curriculum

*The Materials Science and Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.*

#### Lower Division Program

|                                                                                                                                                                                                | UNITS     | QUARTER USUALLY TAKEN |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------|
| <b>Required Courses</b>                                                                                                                                                                        |           |                       |
| Calculus—Mathematics 21A-21B-21C-21D .....                                                                                                                                                     | 16        | 1-2-3-4               |
| Linear algebra—Mathematics 22A ...3 .....                                                                                                                                                      | 3         | 5                     |
| Differential equations—Mathematics 22B .....                                                                                                                                                   | 3         | 6                     |
| General physics—Physics 9A-9B-9C-9D .....                                                                                                                                                      | 16        | 3-4-5-6               |
| General chemistry—2A, 2B or 2AH, 2BH .....                                                                                                                                                     | 10        | 2-3 or 5-6            |
| Introduction to civil and environmental engineering systems—Civil and Environmental Engineering 3 .....                                                                                        | 3         | 1 or 2                |
| Engineering graphics in design—Engineering 4 .....                                                                                                                                             | 3         | 1                     |
| Engineering—applications of computers—Engineering 5 .....                                                                                                                                      | 3         | 2 or 5                |
| Circuits—Engineering 17 .....                                                                                                                                                                  | 4         | 6                     |
| Statics—Engineering 35 .....                                                                                                                                                                   | 3         | 5                     |
| Properties of materials—Engineering 45 .....                                                                                                                                                   | 4         | 6                     |
| Expository writing—English 1 or 3 or Comparative Literature 1, 2, 3 or 4, or Native American Studies 5 .....                                                                                   | 4         | 2 or 3                |
| Introduction to public speaking or group communication—Communication 1 or 3 (or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering) ..... | 4         | 2 or 3                |
| Humanities—Social Science electives and/or General Education electives .....                                                                                                                   | 14        |                       |
| <b>Total Lower Division Units .....</b>                                                                                                                                                        | <b>90</b> |                       |

#### Upper Division Program

In your third year, you will take "fundamentals" courses (Materials Science and Engineering 130, 132, 134, 138). With this background, you are then ready for the "applications" courses (Materials Science and Engineering 140, 142, 144, 146, 147, 148, 149, 155) during the fourth year.

Technical electives, selected from other engineering or physical and natural science disciplines, give you some degree of specialization at the bachelor's degree level. They also provide preparation for research in a selected area at the graduate level. You may select 12 technical elective units to complete the undergraduate Materials Science and Engineering program. By selecting the appropriate technical electives and Humanities and Social Science/General Education electives, you may orient the program to suit your interests and career objectives: production and development, applied research, basic research, teaching, and/or management.

Upper division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives in Materials Science and Engineering.

The following list of suggested areas of specialization is given to assist you and your adviser in the preparation of study lists.

Suggested technical electives:

#### Aerospace Structures:

Aeronautical Science and Engineering 130, 133, 135, 137, 139

#### Automatic Control and Systems Analysis:

Mechanical Engineering 171, 172, 185, 187, 188  
Electrical and Computer Engineering 157A, 157B, 174

#### Biomedical Engineering:

Chemistry 107A, 107B  
Biological Sciences 1A, 1B  
Neurobiology, Physiology and Behavior 111L, 112, 113  
Exercise Science 101, 102

#### Chemical Corrosion:

Chemistry 110A, 110B, 110C or 107A, 107B  
Chemical Engineering 151, 152A, 152B

#### Computers:

Applied Science Engineering 115  
Computer Science Engineering 110, 122A, 122B, 142, 151A, 151B  
Electrical and Computer Engineering 170, 172, 180A, 180B  
Mathematics 128A, 128B, 168  
Statistics 130A, 130B

#### Electronic Materials:

Electrical and Computer Engineering 140A, 140B, 145A, 145B, 146A, 146B, 148  
Materials Science and Engineering 146  
Physics 121, 140A, 140B

#### Environmental Engineering:

Engineering 160 (only one unit of credit towards Technical Elective requirement)  
Atmospheric Science 120  
Biological Sciences 102, 103  
Hydrologic Science 21  
Chemistry 8A, 8B  
Civil and Environmental Engineering 149

#### Heat Transfer:

Engineering 105B  
Mechanical Engineering 165  
Chemical Engineering 150A, 153

#### Materials Design and Processing:

Aeronautical Science and Engineering 137  
Engineering 106  
Materials Science and Engineering 146, 148, 155  
Mechanical Engineering 50, 150, 150A, 150B, 151, 152, 185A, 185B  
Civil and Environmental Engineering 135

#### Physics of Solids:

Physics 115A, 115B, 140A, 140B  
Electrical and Computer Engineering 145A, 145B, 148

Suggested advisers: J.C. Gibeling, J.R. Groza, D.G. Howitt, A.K. Mukherjee, Z.A. Munir, A. Navrotsky, S.H. Risbud, J. F. Shackelford.

#### Upper Division Requirements

UNITS

#### Subject Areas and Courses

|                                                                                                                                                                                                    |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Electronic circuits—Engineering 100 .....                                                                                                                                                          | 3  |
| Applied mechanics—Engineering 102, 103A, 104 .....                                                                                                                                                 | 11 |
| Applied thermodynamics—Engineering 105A, Materials Science and Engineering 130 .....                                                                                                               | 6  |
| Engineering design elective—select from Aeronautical Science and Engineering 137, 138, Civil and Environmental Engineering 132, 135, Mechanical Engineering 150A, 150B .....                       | 9  |
| Materials in design—Materials Science and Engineering 149, and select two courses from Materials Science and Engineering 140, 148, 155 .....                                                       | 9  |
| Measurements and laboratory—Materials Science and Engineering 132L, 134L, 138L, Mechanical Engineering 176 .....                                                                                   | 9  |
| Materials science fundamentals—Materials Science and Engineering 132, 134, 138 .....                                                                                                               | 9  |
| Materials science applications—Select three courses from Materials Science and Engineering 142, 144, 146, 147 or (if not taken for the Materials in Design requirement) 140, 148, 155 .....        | 9  |
| Applied mathematics—Select one course from Engineering 180; Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114 .....                                                   | 3  |
| Basic science—Select from Chemistry 110A, 110C or Physics 140A, 140B, or Chemistry 128A, 128B, or Physics 121, 122, or Geology 161, 162N, or Neurobiology, Physiology and Behavior 101, 101L ..... | 6  |

\*Course not offered this academic year.

|                                                                                  |            |
|----------------------------------------------------------------------------------|------------|
| Technical electives .....                                                        | 6          |
| Humanities–Social Sciences electives and/or<br>General Education electives ..... | 10         |
| <b>Total Upper Division Units .....</b>                                          | <b>90</b>  |
| <b>Minimum Units Required for Major .....</b>                                    | <b>180</b> |

## Mechanical Engineering

(Mechanical and Aeronautical Engineering)

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, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, and economics.

### Mechanical Engineering Curriculum

The Mechanical Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

#### Lower Division Program

Requirements for Mechanical Engineering and the double major Mechanical Engineering/Materials Science.

|                                                                                                                                                                                                                   | UNITS     | QUARTER<br>USUALLY<br>TAKEN |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------|
| <b>Required Courses</b>                                                                                                                                                                                           |           |                             |
| Calculus—Mathematics<br>21A-21B-21C-21D .....                                                                                                                                                                     | 16        | 1-2-3-4                     |
| Linear algebra—Mathematics 22A...3                                                                                                                                                                                | 3         | 5                           |
| Differential equations—<br>Mathematics 22B .....                                                                                                                                                                  | 3         | 6                           |
| General physics—Physics<br>9A-9B-9C-9D .....                                                                                                                                                                      | 16        | 3-4-5-6                     |
| General chemistry—Chemistry 2A-2B<br>or 2AH-2BH .....                                                                                                                                                             | 10        | 2-3 or 4-5                  |
| Engineering graphics in design—<br>Engineering 4 .....                                                                                                                                                            | 3         | 1 or 2                      |
| Applications of computers—<br>Engineering 5 .....                                                                                                                                                                 | 3         | 2 or 5                      |
| Circuits—Engineering 17 .....                                                                                                                                                                                     | 4         | 5 or 6                      |
| Statics—Engineering 35 .....                                                                                                                                                                                      | 3         | 4 or 5                      |
| Properties of materials—<br>Engineering 45 .....                                                                                                                                                                  | 4         | 4 or 6                      |
| Manufacturing processes—<br>Mechanical Engineering 50<br>(Required for Mechanical<br>Engineering and Mechanical/<br>Materials Science and<br>Engineering majors) .....                                            | 3         | 5 or 6                      |
| Expository writing—English 1 or 3, or<br>Comparative Literature 1, 2, 3 or 4,<br>or Native American Studies 5 .....                                                                                               | 4         | 1 or 2                      |
| Introduction to public speaking or<br>group communication—<br>Communication 1 or 3 (or an<br>acceptable substitute as<br>approved by the Undergraduate<br>Study Committee of the College<br>of Engineering) ..... | 4         | 4                           |
| Humanities–Social Sciences and/or<br>General Education electives .....                                                                                                                                            | 15        |                             |
| <b>Total Lower Division Units .....</b>                                                                                                                                                                           | <b>91</b> |                             |

#### Upper Division Programs

You spend your third year in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, mechanical design or thermodynamics. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level.

You 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, lack of mass transportation and 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 solve a variety of problems. 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:

Aeronautical Science and Engineering 130, 133,  
137, 139

Biological Systems Engineering 165

Applied Science Engineering 115

Engineering 111, 122, 160 (only one unit of credit  
towards Technical Electives requirement)

Materials Science and Engineering 140, 142, 155

Mechanical Engineering 134, 150B, 151, 152, 161,  
162, 172, 184A with 184B (both courses must  
be taken), 185A with 185B (both courses must  
be taken), 187, 188

Suggested advisers: A. Barakat, H.H. Cheng, A.A.  
Frank, 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:

Aeronautical Science and Engineering 138

Engineering 160 (only one unit of credit towards  
technical requirements); Engineering 180

Chemical Engineering 161A, 161B

Civil and Environmental Engineering 144, 149

Mechanical Engineering 161, 162, 163, 186

Suggested advisers: R.C. Aldredge, A.I. Barakat,  
J.W. Baughn, J.-J. Chattot, H.A. Dwyer, M.M. Hafez,  
I.M. Kennedy, W. Kollmann, L.W. Rehfield, B.D. Shaw,  
C. van Dam, 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, 184A with 184B

(both courses must be taken)

Civil and Environmental Engineering 149, 150

Suggested advisers: R.C. Aldredge, H.A. Dwyer, 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 program introduces 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 (including advanced energy conversion systems), propulsion (including combustion engines and gas turbines), heat exchangers, industrial processes, refining, and chemical processing. This area of specialization is important to many industries—aerospace, defense, automotive, metals, glass, paper, and plastic—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, 162, 163, 165, 186

Suggested advisers: R.C. Aldredge, J.W. Baughn,  
H.A. Dwyer, H.A. Hoffman, I.M. Kennedy, W. Kollmann,  
B.D. Shaw.

**Manufacturing.** Manufacturing is the process of converting raw materials into products. A major activity of mechanical engineers is studying and working with various production methods and techniques, integrating creative design activities into actual fabricated products.

The emphasis in the manufacturing program is to provide hands-on experience with state-of-the-art and computer-integrated manufacturing methods and processes. Laboratories have been established that have state-of-the-art manufacturing equipment for conventional and non-traditional machining, three-dimensional measurement, and plastic injection molding. Computer-oriented manufacturing is also an emphasis of the program. A manufacturing engineer will have a solid background in manufacturing processes and systems as well as in statistics, design, controls and applications of microprocessors.

Suggested technical electives:

Electrical and Computer Engineering 160, 174

Materials Science and Engineering 140, 155

Mechanical Engineering 151, 153, 154, 172

Suggested advisers: H.H. Cheng, 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.

Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electro-mechanical actuator design, design and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, the analysis of fuel management systems, and the design of flight-control systems for the modeling of human pilot and vehicle dynamics.

An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as testing completed test vehicles. As plans for on-campus laboratories and a test track proceed, 10 experimental vehicles are housed in a rented facility,



and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:

Aeronautical Science and Engineering 128, 129, 131, 139  
Engineering 122

Mechanical Engineering 134, 152, 172, 184A with 184B (both courses must be taken), 187

Suggested advisers: F.O. Eke, A.A. Frank, R.A. Hess, M. Hubbard, D.C. Karnopp, S.A. Snell.

**Ground Vehicle Systems.** An aspect of mechanical engineering is the design of surface vehicles. The emphasis is on the design of more environmentally benign vehicles that can provide transportation while using fewer resources. Innovations in the field require competence in vehicle dynamics, propulsion and engine concepts, control of power transmission, and construction of lightweight manufacturable structures and systems. Alternatively fueled power systems, including electric drives, are also studied.

**Transportation Systems.** An important aspect of Mechanical Engineering is the planning, design, and operation of 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.

Suggested technical electives:

Aeronautical Science and Engineering 127, 128, 129  
Civil and Environmental Engineering 131A, 149, 160  
Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)

Mechanical Engineering 134, 152, 162, 172, 184A with 184B (both courses must be taken), 187

Suggested advisers: A.A. Frank, M. Hubbard, D.C. Karnopp, D.L. Margolis, S. Velinsky.

**Mechanical Engineering  
Upper Division Requirements**

UNITS

**Subject Areas and Courses**

Electronic circuits—Engineering 100 .....3  
Applied mechanics—Engineering 102, 104 ...8  
Applied thermodynamics—Engineering 105A, 105B; Mechanical Engineering 165 .....10  
Fluid mechanics—Engineering 103A, 103B .....6  
Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187 .....12  
Controls and systems analysis—Mechanical Engineering 171 .....4  
Measurements and laboratory—Engineering 107, Mechanical Engineering 176 .....6  
Professional responsibilities—Engineering 190 .....3  
Applied mathematics—Select one course from Engineering 180; Applied Science Engineering 115; Mathematics 128C, 131; Statistics 120, 131A; Civil and Environmental Engineering 114 .....3  
Technical electives .....25

Eighteen of the 25 units must be selected from upper division courses in engineering; of these units, three courses must be chosen from the following design courses: Aeronautical Science and Engineering 128, 129, 130, 137, 138, 139, Materials Science and Engineering 140, 148, Mechanical Engineering 134, 151, 152, 154, 161, 163, 188.

You may also choose from Mechanical Engineering 150B, 172, 184A with 184B (both courses must be taken in consecutive quarters), 185A with 185B (both

courses must be taken in consecutive quarters), 186, 187, if these courses are not used for a core design requirement above.

A combined maximum of 4 units may be selected from project/independent study courses (184–188, 192, 199) not used in satisfaction of core degree requirements.

Humanities—Social Sciences electives and/or General Education electives .....9

**Total Upper Division Units.....89**

**Minimum Units Required for Major.....180**

**Mechanical Engineering/Materials  
Science and Engineering  
Upper Division Requirements**

UNITS

**Subject Areas and Courses**

Electronic circuits—Engineering 100 .....3  
Applied mechanics—Engineering 102, 104 ...8  
Applied thermodynamics—Engineering 105A, 105B; Materials Science and Engineering 130; Mechanical Engineering 165 .....13  
Fluid mechanics—Engineering 103A, 103B ...6  
Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172; and one course chosen from 184A with 184B (both courses must be taken in consecutive quarters), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187 .....12  
Controls and systems analysis—Mechanical Engineering 171 .....4  
Materials science—Materials Science and Engineering 132, 134, 138, and two courses chosen from Materials Science and Engineering 140, 142, 144, 146, 147, 148, 155; and two laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L .....19  
Measurements and laboratory—Engineering 107, Mechanical Engineering 176 .....6  
Applied mathematics—Select one course from: Engineering 180, 182; Applied Science Engineering 115; Mathematics 128C, 131; Statistics 120, 131A; Civil and Environmental Engineering 114 .....3  
Professional responsibilities—Engineering 190 .....3  
Technical electives .....6

In order to satisfy design requirements, two courses must be chosen from Aeronautical Science and Engineering 128, 129, 130, 137, 138, 139, Materials Science and Engineering 140, 148, 149, 155; Mechanical Engineering 134, 151, 152, 154, 161, 162, 163, 188.

You may also choose from Mechanical Engineering 150B, 172, 184A with 184B (both courses must be taken in consecutive quarters), 185A with 185B (both courses must be taken in consecutive quarters), 186, 187, if these courses are not used for a core design requirement above.

A maximum of 4 units of courses numbered 184–188 may be applied to the technical elective degree requirement.

Humanities—Social Sciences electives and/or General Education electives .....9

**Total Upper Division Units.....92**

**Minimum Units Required for Major.....183**

**Courses in Engineering (ENG)**

**Lower Division Courses**

**4. Engineering Graphics in Design (3) I, II.**  
Yamazaki

Lecture—2 hours; laboratory—3 hours. Introduction to engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems.

**5. Applications of Computers (3) I, II, III.**

The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Digital computation and computer programming in FORTRAN. Algorithms and their description. Basic programming; debugging of programs; approximate computing-accuracy and significance; solving simple numerical and nonnumerical problems.

**6. Engineering Problem Solving (4) II, III.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B or 21B (may be taken concurrently). Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications.

**11. Issues in Engineering (1) I.** Shackelford

Lecture—1 hour; discussion—1 hour. Prerequisite: participation in the Minority Engineering Program (MEP) or consent of instructor. Designed to broaden students' understanding of the engineering profession: its methods, principles, design, and development process; career opportunities; and professional resources.

**17. Circuits I (4) I, II, III.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. 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.

**\*25. Introduction to Physical Devices and Systems (3) II.** The Staff

Lecture/discussion—2 hours; laboratory—3 hours. Prerequisite: lower division standing in Engineering and consent of instructor. Introduction to and experience with common hardware and physical devices with the overall goal of enriching the students' understanding of physical devices and systems. (P/NP grading only.)

**35. Statics (3) I, II, III.** The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21D (may be taken concurrently); Physics 9A. Force systems and equilibrium conditions with emphasis on engineering problems.

**45. Properties of Materials (4) I, II, III.** The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: open only to students in the College of Engineering. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. GE credit: Wrt.

**Upper Division Courses**

**100. Electronic Circuits and Systems (3) II, III.**

The Staff

Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 17. 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.

**102. Dynamics (4) I, II, III.** Hess, Hubbard, Karnopp

Lecture—4 hours. Prerequisite: course 35, Mathematics 22B; open to College of Engineering students only. Topics in three-dimensional rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

**103A. Elementary Fluid Mechanics (3) I, II, III.**

Barakat, Chattot, Dwyer, Kollman

Lecture—3 hours. Prerequisite: course 102 (may be taken concurrently). Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis.

**103B. Elementary Fluid Mechanics (3) I, II, III.**

Chattot, Hafez, van Dam

Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; potential flows; compressible flows.

\*Course not offered this academic year.



**104. Mechanics of Materials** (4) I, II, III. The Staff 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.

**104L. Mechanics of Materials Laboratory** (1) II, III. Chai 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.

**105A. Thermodynamics** (3) I, II, III. Capece, Dwyer, Kennedy, Shaw Lecture—3 hours. Prerequisite: Mathematics 21D, 22B; open to College of Engineering students only. Fundamental concepts of thermodynamics: heat energy and work, properties of pure substances, First Law and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales; power cycles: Carnot, Rankine, Brayton; and applications of thermodynamics to engineering systems.

**105B. Thermodynamics** (3) I, II, III. Aldredge, Hoffman, Kennedy Lecture—3 hours. Prerequisite: course 105A; open to College of Engineering students only. Irreversibility and availability, thermodynamic relations, gas and vapor mixtures, and chemical reactions.

**106. Engineering Economics** (3) II, III. Hartsough, Slaughter 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.

**107. Thermal Fluids Laboratory** (3) I, II, III. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 103B and 105B. Experiments to illustrate the first and second laws of thermodynamics thermodynamic cycles, combustion, and principles of thermal and flow measurements.

**111. Electric Power Equipment** (3) I. Delwiche, Hartsough 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.

**122. Introduction to Mechanical Vibrations** (4) I. Hubbard 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.

**130. Introduction to Biomedical Engineering** (3) I. Hull Lecture—3 hours. Prerequisite: courses 36, 45, 100 or consent of instructor. An introduction to the primary fields of specialization in biomedical engineering. Fields include the following: (1) sensors, instrumentation, and signal processing; (2) orthopaedic biomechanics; (3) whole body biomechanics; (4) imaging, and (5) biofluids and transport.

**160. Environmental Physics and Society** (3) I. Jungerman, Craig 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.

**180. Engineering Analysis** (3) I. Hafez Lecture—3 hours. Prerequisite: Mathematics 22B, course 5. Analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

**190. Professional Responsibilities of Engineers** (3) II, III. Sanders 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.

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## Engineering: Applied Science

(College of Engineering)

Neville C. Luhmann, Jr., Ph.D., Chairperson of the Department

Rao Vemuri, Ph.D., Vice Chairperson of the Department

Department Office, 228 Walker Hall (530-752-0360); Hertz Hall, Livermore (925-422-9787)

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### Faculty

Hector A. Baldis, Ph.D., Professor  
Meera M. Blattner, Ph.D., Professor  
Stephen P. Cramer, Ph.D., Professor  
Richard R. Freeman, Ph.D., Professor  
David Q. Hwang, Ph.D., Professor  
Brian H. Kolner, Ph.D., Professor  
Denise M. Krol, Ph.D., Professor  
Neville C. Luhmann, Jr., Ph.D., Professor  
Nelson Max, Ph.D., Professor  
William McCurdy, Ph.D., Professor  
Ann Orel, Ph.D., Professor  
Garry Rodrigue, Ph.D., Professor  
Rao Vemuri, Ph.D., Professor  
Yin Yeh, Ph.D., Professor

### Emeriti Faculty

Berni J. Alder, Ph.D., Professor Emeritus  
Stewart D. Bloom, Ph.D., Professor Emeritus  
Richard Christensen, Ph.D., Professor Emeritus  
Paul P. Craig, Ph.D., Professor Emeritus  
John S. De Groot, Ph.D., Professor Emeritus  
William G. Hoover, Ph.D., Professor Emeritus  
John Killeen, Ph.D., Professor Emeritus  
William A. Newcomb, Ph.D., Professor Emeritus  
Richard F. Post, Ph.D., Professor Emeritus  
Wilson K. Talley, Ph.D., Professor Emeritus  
Edward Teller, Ph.D., University Professor Emeritus  
Frederick Wooten, Ph.D., Professor Emeritus

### Affiliated Faculty

Woodrow W. Clark, Ph.D., Lecturer  
Farid U. Dowla, Ph.D., Adjunct Associate Professor  
Dennis L. Matthews, Ph.D., Adjunct Professor  
Louis J. Terminello, Ph.D., Adjunct Associate Professor

## Courses in Engineering: Applied Science—Davis (EAD)

### Lower Division Courses

**90C. Research Group Conference for Lower Division Students** (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: lower division standing; consent of instructor. May be repeated for credit. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**115. Introduction to Numerical Methods for Engineers and Scientists** (3) I, II, III. Yeh, Cramer, De Groot Lecture—3 hours. Prerequisite: Engineering 5, Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

**116. Computer Solution of Physical Problems** (3) III. Cramer, De Groot Lecture—3 hours. Prerequisite: course 115 or consent of instructor. Application of computers to solution of physical problems. Numerical solution of elliptic, parabolic, and hyperbolic partial differential equations; eigenvalue problems, Monte Carlo methods, linear programming.

**137. Science and Technology of Nuclear Arms Effects and Control** (3) I. Jungerman (Physics), Craig

Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 1B, 5C, 9D, or 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) (Same course as Physics 137.) GE credit: SciEng or SocSci.

**165A. Quantum Optics I** (3) II. Yeh Lecture—3 hours. Prerequisite: Physics 110A-110B or the equivalent. Quantum nature of light and matter. Statistics of photons in chaotic, coherent and mixed states. Concepts of photon coherence and correlation. Development of a coherent state from a chaotic photon distribution.

**165B. Quantum Optics II** (3) III. Yeh Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric counting statistics. Photon distributions in scattering processes and in nonlinear optical processes.

**166A. Quantum Optics Laboratory** (1) II. Yeh Laboratory—3 hours. Prerequisite: course 165A concurrently. Hands on experience in working with lasers, photon spectroscopy, electro-optical devices and photoelectric counting statistics.

**166B. Quantum Optics Laboratory** (1) III. Yeh Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 166A.

**171. Scanning Probe Microscopy** (4) III. Yeh Lecture—3 hours; laboratory—3 hours. Prerequisite: Electrical and Computer Engineering 130A, Engineering 102, Chemistry 110B or the equivalent. Physics of scanning microprobe techniques, scanning tunneling microscope and atomic force microscope will be studied, as will their applications to surfaces and structural biology. Operational STM and AFM will further students' experience in nano-scale science and technology.

**180. Introduction to Plasma Physics and Controlled Fusion** (3) I. The Staff Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.

**181. Plasma Physics Laboratory** (1) I. De Groot Laboratory—3 hours. Prerequisite: course 180 concurrently. Langmuir probes, plasma sources, Landau

damping of ion acoustic waves, ion acoustic shocks, ion-ion two-stream instability.

**190C. Research Group Conference for Advanced Undergraduates** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**198. Group Study** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**228A-228B-228C. Properties of Matter** (3-3-3)  
I-II-III. Freeman, Yeh, Baldis, McCurdy  
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

**230A-230B-230C. Structure of Matter** (3-3-3)  
I-II-III. Yeh, Freeman, Orel, Krol  
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C (may be taken concurrently). Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.

**234A-234B-234C. Electromagnetic Theory** (3-3-3) I-II-III. Luhmann, Hwang, Freeman  
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plasmas. Transmission of electromagnetic waves through material. Modern applications of theory.

**271. Optical Methods in Biophysics** (3) I. Yeh, Matthews  
Lecture—3 hours. Prerequisite: Physics 110A-110B-110C, Chemistry 110A, 110B, or the equivalent. Physics of light-matter interactions used in biophysical research. Techniques of absorption, ellipsometry, fluorescence, phosphorescence, elastic and inelastic scattering, diffraction, and nonlinear optics are applied to the studies of proteins, nucleic acids, lipids, and supra-molecular organizations in biological systems. Offered in alternate years.

**280A-280B-280C. Plasma Physics and Controlled Fusion** (3-3-3) I-II-III. Luhmann, Hwang  
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.

**285A. Physics and Technology of Microwave Vacuum Electron Beam Devices I** (4) III. Luhmann  
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.

**285B. Physics and Technology of Microwave Vacuum Electron Beam Devices II** (4) I. Luhmann  
Lecture—4 hours. Prerequisite: 285A. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years.

**285C. Physics and Technology of Microwave Vacuum Electron Beam Devices III** (4) II. Luhmann  
Lecture—4 hours. Prerequisite: 285B. Physics and technology of gyrotrons, gyro-amplifiers, free elec-

tron lasers, magnetrons, crossfield amplifiers and relativistic devices. Offered in alternate years.

**285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV** (4) III. Luhmann

Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.

**289A-K. Special Topics in Applied Science** (1-5) I, II, III. The Staff

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Digital Media; (E) Materials Science; (F) Imaging Science and Photonics; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electronics; (J) Solid State; (K) Microwave and Millimeter Wave Technology. May be repeated for credit up to a total of 5 units per segment when topic differs.

**290. Seminar** (1-2) I, II, III. The Staff  
Seminar—1-2 hours. (S/U grading only.)

**290C. Graduate Research Group Conference** (1) I, II, III. The Staff  
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff  
(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

## Courses in Engineering: Applied Science—Livermore (EAL)

### Upper Division Course

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**201. Software Engineering** (3) I. Blattner  
Lecture—3 hours. Prerequisite: data structures, elementary knowledge of software development methodology; knowledge of an object-oriented language is desirable. First part of course examines the development of large production-quality programs, project management techniques, software design methodologies. The second part covers automated and integrated software tools and object-oriented methods of design. Problems associated with user interface management systems are discussed. (Former course 201A.)

**203. Computer Architecture** (3) III. Vemuri  
Lecture—3 hours. Prerequisite: Computer Science Engineering 250A. Topics in computer communication, hardware features to enhance operating systems, advanced architectures, memory hierarchy, parallel architectures, and vector computing.

**204. Knowledge Representation** (3) III. Blattner  
Lecture—3 hours. Prerequisite: Computer Science Engineering 270 and 222A, or the equivalent. Course explores expressive adequacy, computational efficiency, non-deductive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in alternate years.

**205A. Mathematical Methods** (3) I. Orel, Rodrigue, Freeman  
Lecture—3 hours. Prerequisite: calculus. Complex variables, theory of convergence, evaluation of definite integrals, factorial function (gamma function), asymptotic expansions, fourier analysis.

**205B. Mathematical Methods** (3) II. Orel, Rodrigue, Freeman  
Lecture—3 hours. Prerequisite: course 205A. Laplace transforms, Sturm-Liouville theory, solution of second order linear ODE, approximate solutions of ODE, calculus of variations, characteristics.

**205C. Mathematical Methods** (3) III. Orel, Rodrigue, Freeman  
Lecture—3 hours. Prerequisite: course 205B. Spherical harmonics, Bessel functions, conformal mapping, hypergeometric functions, elliptic functions.

**207. Compiler Construction** (3) I. Blattner  
Lecture—3 hours. Prerequisite: Computer Science Engineering 240. Syntax-directed translation techniques are used to implement a compiler for a high-level programming language. Emphasis on semantic analysis and code generation and optimization.

**210A. Numerical Methods in Applied Science** (3) I. Rodrigue, Vemuri  
Lecture—3 hours. Prerequisite: calculus through differential equations and vector analysis. Numerical techniques used in a wide variety of applications of digital computers to problems in applied science. Emphasis placed on the common mathematical elements of the techniques developed.

**210B. Numerical Methods in Applied Science** (3) II. Rodrigue, Vemuri  
Lecture—3 hours. Prerequisite: course 210A. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite-difference, finite-element, and spectral methods for linear hyperbolic, parabolic, and elliptic systems and nonlinear hyperbolic systems.

**210C. Numerical Methods in Applied Science** (3) III. Rodrigue, Vemuri  
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.

**211A. Numerical Solution of Partial Differential Equations I** (3) I. Rodrigue  
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.

**211B. Numerical Solution of Partial Differential Equations II** (3) II. Rodrigue  
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.

**211C. Numerical Solution of Partial Differential Equations III** (3) III. Rodrigue  
Lecture—3 hours. Prerequisite: course 211B. Conservation laws, fluid equations, turbulence, elasticity equations, electromagnetic equations, transport equations.

**213A. Computer Graphics** (3) II. Max  
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.

**213B. Computer Graphics** (3) III. Max  
Lecture—3 hours. Prerequisite: course 213A or Computer Science Engineering 175. Algorithms to produce color raster renderings of three-dimensional models.

**214. Scientific Visualization** (3) II. Max  
Lecture—3 hours. Prerequisite: Computer Science Engineering 175 or consent of instructor. Visualization of 3D data, including scalar fields, vector fields, and molecular structures. Primary emphasis on volume visualization algorithm.

**215. Computer Animation** (3) III. Max  
Lecture—3 hours. Prerequisite: Computer Science Engineering 175A or course 213A. Control of camera and object motion necessary to produce computer animation, modeling of articulated objects made from jointed segments, and of deformable objects. Students will complete a final animation project. (Same course as Computer Science Engineering 279). Offered in alternate years.

**216A-G. Special Topics in Computer Science** (1-5) I, II, III. The Staff  
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas:

(A) Architecture; (B) Software Systems; (C) Language Translation; (D) Language Design; (E) Operating Systems; (F) Foundations of Computing; (G) Computational Mathematics. May be repeated for credit for a total of 5 units per segment if topic differs.

**217A-217B. Computational Science** (3-3) I, II. Rodrigue

Lecture—3 hours. Prerequisite: courses 205A and 205B (may be taken concurrently). Designed for physical scientists. Topics in computer science with applications to computational science. Computer organization and architecture, data structures, algorithms and complexity, software environments for scientific visualization, symbolic computation.

**218. Signal Processing** (3) I. Blattner, Dowla  
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.

**219. Wavelets and Their Applications** (3) II. Dowla

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.

**220A. Artificial Neural Nets-I** (3) I. Vemuri  
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.

**220B. Artificial Neural Nets-II** (3) II. Vemuri  
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.

**221. Genetic Algorithms and Optimization** (3) III. Vemuri  
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.

**222. User Interfaces** (3) II. Blattner  
Lecture—3 hours. Prerequisite: Computer Science Engineering 110. Design and evaluation of the interface between systems and users. Covers user interaction styles and techniques, display formats, user guidance, and methodologies for designing and evaluating user interfaces. Offered in alternate years.

**223. Multimedia Interfaces** (3) I. Blattner  
Lecture—3 hours. Prerequisite: course 222 recommended. Examines basic paradigms of multimedia interfaces and time-varying systems, navigation through the multimedia system, hypermedia as well as study of interaction devices such as audio, gesture, video, pen-based systems, and audio input and output. Virtual reality systems and intelligent interfaces will conclude the course. Offered in alternate years.

**224. Theories of Human-Computer Interaction** (3) I. Blattner  
Lecture—3 hours. Prerequisite: data structures and basic statistics; a course in user interfaces is desirable. Some basic cognitive science pertaining to computer usage is introduced (such as memory, sensory limits, and problem solving) followed by models of human activity; task analysis; different paradigms

for computer use; models of cooperative activity; cultural differences in human-computer interaction; users with disabilities; and adaptive interfaces. Offered in alternate years.

**225. Computational Structures for Signal and Image Processing and Graphics** (3) III. Vemuri  
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.

**226. Practical Data Communications in Digital Media** (3) II. Vemuri, Dowla  
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.

**227. Chaos, Fractals and Nonlinear Phenomena** (3) III. Hoover  
Lecture—3 hours. Prerequisite: courses 205A and 205B. A computational treatment of pervasive instabilities in simulation—"sensitive dependence on initial conditions"—called "Chaos." Connecting the Second Law of Thermodynamics to nonlinear dynamics with "strange attractors;" these are generally "fractal" objects with great aesthetic and intellectual appeal.

**228A-228B-228C. Statistical Mechanics** (3-3-3) I-II-III. Freeman, Yeh, Baldis, McCurdy  
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics: constitutive, electrical, mechanical and thermal properties.

**230A-230B-230C. Quantum Mechanics** (3-3-3) I-II-III. Freeman, Orel, Krol  
Lecture—3 hours. Prerequisite: courses 205A-205B-205C (may be taken concurrently). Classical properties of matter; introduction to quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

**233A-233B-233C. Theory and Applications of Solid-State Physics** (3-3-3) I-II-III. Wooten, Terminello  
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.

**234A-234B-234C. Electromagnetic Theory** (3-3-3) I-II-III. Luhmann, Hwang, Freeman  
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plasmas. Transmission of electromagnetic waves through material. Modern applications of theory.

**255. Classical Mechanics** (3) I. Baldis, Yeh  
Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics; variational principles; Lagrange's and Hamilton's equations; kinematics; collisions.

**256. Continuum Mechanics** (3) II. Christensen  
Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

**257. Computational Continuum Mechanics** (3) Hoover  
Lecture—3 hours. Prerequisite: Mathematics 121A, 121B and 128C. Fundamental conservation and constitutive equations for continua, together with numeri-

cal techniques for their solution, including Eulerian, Lagrangian, and particle methods.

**262A-262B-262C. Atomic and Molecular Interactions** (3-3-3) I-II-III. Orel, Freeman  
Lecture—3 hours. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and spectra, molecular structure and spectra, classical and quantum mechanical collision theory of electron and heavy particle scattering.

**265A-265B. Laser Physics** (3-3) I-II. Freeman, Krol, Kolner  
Lecture—3 hours. Prerequisite: courses 230A-230B-230C, 234A-234B-234C. Theory of generation of laser radiation and its interaction with matter. Dynamics of laser media, oscillators/amplifiers. Short pulse generation and propagation. Coherence properties of laser radiation. Fourier optics, resonators, and holography. Characteristics of laser devices. Laser spectroscopy.

**266A-266B. Laser Physics Laboratory** (3-3) I-II. Kolner, Krol  
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B (may be taken concurrently). Experiments exploring principles of generation and propagation of laser radiation. Laser measurement techniques. Dynamics of laser media. Oscillators and amplifiers. Generation of short pulses. Coherence properties of laser radiation. Holography. Characteristics of laser devices. Laser spectroscopy.

**267. Nonlinear Optics** (3) III. Krol  
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.

**267L. Nonlinear Optics Laboratory** (3) III. Krol  
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric oscillation and amplification, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation. Laser spectroscopy.

**280A-280B-280C. Plasma Physics and Controlled Fusion** (3-3-3) I-II-III. Hwang, Luhmann  
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.

**285A. Physics and Technology of Microwave Vacuum Electron Beam Devices I** (4) III. Luhmann  
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.

**285B. Physics and Technology of Microwave Vacuum Electron Beam Devices II** (4) I. Luhmann  
Lecture—4 hours. Prerequisite: 285A. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years.

**285C. Physics and Technology of Microwave Vacuum Electron Beam Devices III** (4) II. Luhmann  
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.



**285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV** (4) III.

Luhmann

Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.

**289A-K. Special Topics in Applied Science**

(1-5) I, II, III. The Staff

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: **(A)** Atomic and Molecular Physics; **(B)** Chemical Physics; **(C)** Computational Physics; **(D)** Digital Media; **(E)** Materials Science; **(F)** Imaging Science and Photonics; **(G)** Nonlinear Optics; **(H)** Plasma Physics; **(I)** Quantum Electronics; **(J)** Solid State; **(K)** Microwave and Millimeter Wave Technology. May be repeated up to a total of 5 units per segment when topic differs.**290. Seminar.** (1-2) I, II, III. The Staff (Chair in charge)

Seminar—1-2 hours. (S/U grading only.)

**290C. Graduate Research Group Conference**

(1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chair in charge)

(S/U grading only.)

## Engineering: Biological and Agricultural

(College of Engineering)

David J. Hills, Ph.D., Chairperson of the Department  
Department Office, 2030 Bainer Hall (530-752-0102)  
World Wide Web: <http://www.engr.ucdavis.edu/~bae/>**Faculty**

Pictiaw (Paul) Chen, Ph.D., Professor  
 Michael J. Delwiche, Ph.D., Professor  
 D. Ken Giles, Ph.D., Professor  
 Mark E. Grismer, Ph.D., Professor  
 Bruce R. Hartsough, Ph.D., Professor  
 David J. Hills, Ph.D., Professor  
 Bryan M. Jenkins, Ph.D., Professor  
 John M. Krochta, Ph.D., Professor  
 Miguel A. Mariño, Ph.D., Professor  
 Kathryn McCarthy, Ph.D., Associate Professor  
 Michael J. McCarthy, Ph.D., Professor  
 John A. Miles, Ph.D., Professor  
 Ning Pan, Ph.D., Associate Professor  
 Raul H. Piedrahita, Ph.D., Associate Professor  
 Richard E. Plant, Ph.D., Professor  
 James W. Rumsey, M.S., Lecturer  
 Thomas R. Rumsey, Ph.D., Professor  
 R. Paul Singh, Ph.D., Professor  
 David C. Slaughter, Ph.D., Associate Professor  
 Shrinivasa K. Upadhyaya, Ph.D., Professor  
 Jean S. VanderGheynst, Ph.D., Assistant Professor  
 Wesley W. Wallender, Ph.D., Professor  
 Ruihong Zhang, Ph.D., Assistant Professor

**Emeriti Faculty**

Norman B. Akesson, M.S., Professor Emeritus  
 Robert H. Burgy, M.S., Professor Emeritus  
 William J. Chancellor, Ph.D., Professor Emeritus  
 Robert B. Fridley, Ph.D., Professor Emeritus  
 Roger E. Garrett, Ph.D., Professor Emeritus  
 John R. Goss, M.S., Professor Emeritus  
 S. Milton Henderson, M.S., Sc.D., Professor Emeritus  
 Robert A. Kepner, B.S., Professor Emeritus  
 Coby Lorenzen, Jr., M.S., Professor Emeritus  
 R. Larry Merson, Ph.D., Professor Emeritus  
 Stanton R. Morrison, Ph.D., Professor Emeritus  
 Michael O'Brien, 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**

Frank C. Beall, Ph.D., Professor  
 James M. Meyers, Ph.D., Extension Specialist  
 William E. Steinke, Ph.D., Extension Specialist  
 James F. Thompson, M.S., Extension Specialist

### Courses in Engineering: Biological Systems (EBS)

**Lower Division Courses****1. Introduction to Biological Systems and Food Engineering** (3) I. Giles

Lecture—2 hours; laboratory—3 hours. Introduction to engineering and the engineering design process, with examples drawn from the fields of agriculture, biological and food engineering. Emphasis on the relationship of engineering principles to biological systems. Laboratories include small group design projects and presentations.

**2L. Biosystems Engineering Graphics Design Laboratory** (1) II, III. The Staff (Chairperson in charge)

Laboratory—3 hours. Prerequisite: course 1 concurrently. Restricted to students in Biological Systems Engineering or Food Engineering. Introduction to the graphical communication techniques of computer-aided design (CAD). Laboratory exercises in CAD techniques for the visualization and communication of three-dimensional objects with applications in design of agricultural, biological and food systems.

**25. Biosystems Engineering in Industry** (2) III.VanderGheynst, Giles, Thompson  
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1, Biological Sciences 1A, Physics 9B. Introduction to industrial applications of engineering design applied to food production, energy and environmental systems and biotechnology. Focus on the application of calculus, science and basic engineering fundamentals to the design of biological processes. Emphasis on team work, written and oral communication skills.**75. Properties of Materials in Biological Systems** (4) II. Slaughter

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.

**90C. Research Group Conference in Biological Systems Engineering** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**90X. Lower Division Seminar** (1-4) I, II, III.The Staff  
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.**92. Internship in Biological Systems****Engineering** (1-5) I, II, III. The Staff (Hills in charge)

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) I, II, III. The Staff (Hills in charge)

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) I, II, III. The Staff (Hills in charge)  
(P/NP grading only.)**Upper Division Courses****114. Principles of Field Machinery Design** (3)

III. Chen

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.

**115. Forest Engineering** (3) III. Hartsough

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.

**116. Forest Engineering Field Problems** (2) I.

Miles

Lecture—1 hour; three weekend field trips to Blodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

**120. Power and Energy Conversion** (4) II.

Jenkins

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 17, 102, 103A, 105A. Fundamentals of energy conversion with applications to biological and agricultural systems. Design and performance characteristics of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fans, pumps, mechanical transmissions, and others. Selection of units for power matching and optimal performance.

**125. Heat and Mass Transfer in Biological****Systems** (4) II. VanderGheynst

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 75, Engineering 105A. Heat and mass transfer and psychrometrics with principal applications to biological, food, and environmental processes. Steady and transient heat and mass transfer. Analysis of heat conduction, convection and radiation, and material diffusion and convection. Analysis of heat and mass transfer with non-Newtonian fluid flow.

**130. Dynamic Modeling of Processes in****Biological Systems** (4) II. Rumsey

Lecture/discussion—4 hours. Prerequisite: Engineering 5 or the equivalent. 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.

**132. Unit Operations in Biological and Food****Engineering** (4) III. Piedrahita, VanderGheynst

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 125, 130. Mechanical unit operations which involve non-Newtonian flow, size reduction and mixing. Thermal operations related to drying, sterilization, freezing, and refrigeration. Mass transfer operations applied to membrane separations, adsorption, and absorption processes.

**135. Bioenvironmental Engineering** (4) III.

Zhang

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.

**143. Analytical Hydrology and Watershed****Management** (3) II. The Staff

Lecture—3 hours. Prerequisite: Engineering 103A or Hydrologic Science 103, and working knowledge of FORTRAN. Introduction to watershed hydrology modeling. Techniques in precipitation, evaporation, infiltration, subsurface and overland flow, non-point source pollution, snowmelt, and their formulation in watershed model design and programming. (Same course as Hydrologic Science 143.)



**145. Irrigation and Drainage Systems** (4) II.

Wallender, Grismer, Hills

Lecture—4 hours. Prerequisite: Engineering 103A 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 will be emphasized. (Same course as Hydrologic Science 115.)

**165. Bioinstrumentation and Control** (3) I.

Delwiche

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.

**170A. Engineering Design and Professional Responsibilities** (3) III. Miles

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.

**170B. Engineering Projects: Design** (2) I, II.

Miles

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. (Deferred grading only, pending completion of course 170C.)

**170BL. Engineering Projects: Design**

Laboratory (1) I, II. The Staff (Chairperson in charge)

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. (Deferred grading only, pending completion of course 170CL.)

**170C. Engineering Projects: Design Evaluation** (1) II, III. Miles

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.

**170CL. Engineering Projects: Design**

Evaluation (2) II, III. The Staff (Chairperson in charge)

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.

**175. Rheology of Biological Materials** (3) II. K.

McCarthy

Lecture—3 hours. Prerequisite: Chemical Engineering 150A or Engineering 103A; and Engineering 105A or Chemical Engineering 152A. Introduction to 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).

**189A-G. Special Topics in Biological Systems**

Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

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.

**190C. Research Group Conference in Biological Systems Engineering** (1) I, II, III.

The Staff (Chairperson in charge)

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.)

**190X. Upper Division Seminar** (1-4) I, II, III.

The Staff

Seminar—1-4 hours. Prerequisite: consent of instructor. In-depth examination of a special topic in a small group setting.

**192. Internship in Biological Systems**

Engineering (1-5) I, II, III. The Staff (Hills in charge)

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) I, II, III. The Staff

Tutorial—1-5 hours. Prerequisite: upper division standing in engineering; consent of instructor. Tutoring of students in undergraduate biological systems engineering courses. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Hills in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced**

Undergraduates (1-5) I, II, III. The Staff (Hills in charge)

(P/NP grading only.)

**Graduate Courses****200. Research Methods in Biological Systems Engineering** (2) I. Giles

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.

**\*215. Soil-Machine Relations in Tillage and Traction** (3) II. Upadhyaya

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.

**216. Energy Systems** (3) II. Jenkins

Lecture—3 hours. Prerequisite: Engineering 105A. 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.

**\*218. Solar Thermal Engineering** (3) I. T.

Rumsey

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.

**220. Pilot Plant Operations in Aquacultural Engineering** (3) I or III. Piedrahita

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. Labo-

ratory study of unit operations in aquaculture. Offered in alternate years.

**231. Mass Transfer in Food and Biological Systems** (3) I. Krochta

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.

**233. Analysis of Processing Operations:****Drying and Evaporation** (3) II. T. Rumsey

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.

**235. Advanced Analysis of Unit Operations in Food and Biological Engineering** (3) III. Singh

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.

**\*237. Thermal Process Design** (3) III. T. Rumsey

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.

**\*239. Magnetic Resonance Imaging in Biological Systems** (3) I. M. McCarthy

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.

**240. Infiltration and Drainage** (3) II. Grismer

Lecture—3 hours. Prerequisite: Soil Science 107; Engineering 103A. 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.

**241. Sprinkle and Trickle Irrigation Systems** (3) III. Hills

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.

**\*242. Hydraulics of Surface Irrigation** (3) III.

Wallender

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.

**\*243. Water Resource Planning and****Management** (3) I. Marino

Lecture—3 hours. Prerequisite: Hydrologic Science 141. 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.

**245. Waste Management for Biological Production Systems** (3) II. Zhang

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production

## 234 Engineering: Chemical Engineering and Materials Science

systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials.

**260. Analog Instrumentation** (4) II. Delwiche  
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.

**265. Design and Analysis of Engineering Experiments** (4) III. Upadhyaya, Plant  
Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics or consent of instructor. Design, management, and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities are assigned.

**270. Modeling and Analysis of Biological and Physical Systems** (4) III. Upadhyaya, T. Rumsey  
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: Civil and Environmental Engineering 212A. Mathematical modeling of biological systems: model development; analytical and numerical (finite difference and finite elements) solutions. Case studies from various specializations within Biological and Agricultural Engineering. Offered in alternate years.

**275. Physical Properties of Biological Materials** (3) I. Chen  
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.

**289A-K. Selected Topics in Biological Systems Engineering** (1-5) I, II, III. The Staff  
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.

**290. Seminar** (1) I, II, III. The Staff  
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) I, II, III. The Staff (Hills in charge)  
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.)

**297. Advances in Food Engineering** (1) I, II, III. Singh  
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in food engineering. Presentations by individual students. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Hills in charge)

**299. Research** (1-12) I, II, III. The Staff (Hills in charge)  
(S/U grading only.)

### Professional Course

**390. Supervised Teaching in Biological and Agricultural Engineering** (1-3) I, II, III. The Staff  
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.)

## Engineering: Chemical Engineering and Materials Science

(College of Engineering)  
Subhash H. Risbud, Ph.D., Chairperson of the  
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### Faculty

Nicholas L. Abbott, Ph.D., Assistant Professor  
David E. Block, Ph.D., Assistant Professor (*Chemical Engineering, Viticulture and Enology*)  
Roger B. Boulton, Ph.D., Professor (*Chemical Engineering, Viticulture and Enology*)  
Stephanie R. Dungan, Ph.D., Assistant Professor (*Chemical Engineering, Food Science and Technology*)

Bruce C. Gates, Ph.D., Professor  
Jeffery C. Gibeling, Ph.D., Professor  
Joanna R. Groza, Ph.D., Associate Professor  
Brian G. Higgins, Ph.D., Professor  
David G. Howitt, Ph.D., Professor  
Alan P. Jackman, Ph.D., Professor  
Marjorie L. Longo, Ph.D., Assistant Professor  
Benjamin J. McCoy, Ph.D., Professor  
Karen A. McDonald, Ph.D., Associate Professor  
Amiya K. Mukherjee, D.Phil., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*

Zuhair A. Munir, Ph.D., Professor  
Alexandra Navrotsky, Ph.D., Professor (*Materials Science and Engineering; Chemistry; Land, Air, and Water Resources*)

Ahmet N. Palazoglu, Ph.D., Professor  
Ronald J. Phillips, Ph.D., Assistant Professor  
Robert L. Powell, Ph.D., Professor  
Subhash H. Risbud, Ph.D., Professor  
Dewey D.Y. Ryu, Ph.D., Professor  
James F. Shackelford, Ph.D., Professor  
Pieter Stroevé, Sc.D., Professor, *Academic Senate Distinguished Teaching Award*  
Stephen Whitaker, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

### Emeriti Faculty

Richard L. Bell, Ph.D., Professor Emeritus  
Howard L. Needles, Ph.D., Professor Emeritus  
J. M. Smith, Sc.D., Professor Emeritus  
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

## Courses in Engineering: Chemical (ECH)

(Courses in Chemical Engineering (ECH) are listed below; courses in Materials Science and Engineering (EMS) are listed immediately following.)

### Lower Division Courses

**1. The Scope of Chemical Engineering** (1) II. The Staff (Chairperson in charge)  
Lecture—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, with clarification of what chemical engineers actually do in various jobs. (P/NP grading only.)

**90X. Lower Division Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. Examination of a special topic in a small group setting.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**150A. Chemical Engineering Fluid Mechanics** (4) II. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 21D, Engineering 35. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Not open for credit to students who have completed Engineering 103A.

**150B. Chemical Engineering Fluid Mechanics** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation and the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and choke flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

**150C. Rheology and Polymer Processing** (4) III. The Staff  
Lecture—4 hours. Prerequisite: course 150A. Fundamentals of rheology. Introduction to polymer processing unit operations.

**\*150L. Polymer Engineering Laboratory** (4) II. The Staff  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150C, Chemistry 2C or 2CH, or consent of instructor. Introduction to specialized equipment to learn about principles governing preparation of macromolecules and their properties. Principles and properties relevant to processing polymers. Environmental effects in polymer applications. Molecular engineering design.

**151. Material Balances** (3) I. The Staff  
Lecture—3 hours. Prerequisite: Chemistry 110A, Chemistry 128B (may be taken concurrently), Engineering 5. Application of the principles of conservation of mass to single and multi-component systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, and chemical reaction.

**152A. Chemical Engineering Thermodynamics** (3) II. The Staff  
Lecture—3 hours. Prerequisite: course 151, Chemistry 110A. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105A.

**152B. Chemical Engineering Thermodynamics** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105B.

**153. Chemical Engineering Heat Transfer** (4) III. The Staff  
Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

**154A. Mass Transfer** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

**154B. Applications of Mass Transfer (3) II.**

The Staff

Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation, and other separation processes.

**155A. Chemical Engineering Laboratory (4) I, II.**

The Staff

Laboratory—6 hours; discussion—1 hour; term paper. Prerequisite: course 154A (may be taken concurrently) and satisfaction of the Engineering upper division English composition requirement. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.

**155B. Chemical Engineering Laboratory (4) II, III.**

The Staff

Laboratory—6 hours; discussion—1 hour; extensive writing. Prerequisite: courses 154B (may be taken concurrently) and 155A. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biological Systems Engineering. Continuation of 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.

**156A. Chemical Engineering Kinetics (4) II.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 152B, 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

**156B. Chemical Engineering Kinetics (4) III.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 156A. Continuation of course 156A.

**157. Process Dynamics and Control (3) I.**

McDonald

Lecture—3 hours. Prerequisite: course 159. Fundamentals of dynamic modelling of chemical processes. Design and analysis of classical feedback control of chemical processes.

**157L. Process Control Laboratory (1) II, III.**

The Staff

Laboratory—3 hours; discussion—1 hour. Prerequisite: course 157. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, and Food Engineering. Laboratory experiments in control system design and analysis.

**158A. Economics and Optimization of Chemical Processes (3) I.**

Palazoglu

Lecture—3 hours. Prerequisite: senior standing. Fundamentals of economics, interest calculations, depreciation, taxes. Economic analysis of chemical plant designs. Optimization methods. Linear and non-linear programming.

**158B. Process Equipment Design (3) II.**

Palazoglu

Lecture—3 hours. Prerequisite: course 158A. Design of chemical process equipment. Equipment cost estimation techniques.

**158C. Chemical Plant Design (3) III.**

Palazoglu

Lecture—2 hours; discussion—1 hour. Prerequisite: course 158B. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Materials Science, Chemical/Biochemical Engineering, Biomedical Engineering, Food Engineering, Biosystems Engineering. Conceptual design of chemical processes. Design, costing and profitability analysis of complete chemical plants. Use of computer-aided design techniques.

**159. Chemical Engineering Analysis (3) I.**

The Staff

Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

**161A. Biochemical Engineering Fundamentals (3) II.**

The Staff

Lecture—3 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. Not open for credit to students who have completed course 161.

**161B. Bioseparations (3) II.**

The Staff

Lecture—3 hours. Prerequisite: course 154A. Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation processes.

**161C. Biotechnology Facility Design and Regulatory Compliance (4) II.**

Block

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.

**161L. Bioprocess Engineering Laboratory (4) III.**

The Staff

Laboratory—9 hours; discussion—1 hour. Prerequisite: courses 161A and 161B; or Viticulture and Enology 186; or Biological Sciences 103 and Molecular and Cellular Biology 120L. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography.

**166. Catalysis (3) II.**

Gates

Lecture—3 hours. Prerequisite: course 156A (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.

**170. Introduction to Colloid and Surface Phenomena (3) III.**

Stroeve

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.

**190C. Research Group Conferences (1) I, II, III.**

The Staff

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.)

**190X. Upper Division Seminar (1) I, II, III.**

The Staff

Seminar—1 hour. Prerequisite: upper division standing. In-depth examination of a special topic in a small group setting.

**198. Group Study (1-5) I, II, III.**

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.**

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****\*206. Biochemical Engineering (3) II.**

Ryu

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.

**226. Enzyme Engineering (3) II.**

Ryu

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.

**246. Advanced Biochemical Engineering (2) II.**

Ryu

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.

**252. Statistical Thermodynamics (4) I.**

The Staff

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.

**253A. Advanced Fluid Mechanics (4) I.**

The Staff

Lecture—4 hours. Prerequisite: courses 150A, 150B and 259. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey or rectilinear creeping flow, lubrication flow, and boundary layer theory.

**253B. Advanced Heat Transport (4) II.**

The Staff

Lecture—4 hours. Prerequisite: courses 153 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 Green's functions and perturbation theory. Photon transport, black and gray body radiation, radiant exchange. Free and forced convection.

**253C. Advanced Mass Transfer (4) I.**

The Staff

Lecture—4 hours. Prerequisite: courses 154A, 154B, 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.

**254. Colloid and Surface Phenomena (4) III.**

Stroeve, Longo

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.

**256. Chemical Kinetics and Reaction Engineering (4) II.**

The Staff

Lecture—4 hours. Prerequisite: courses 156A and 156B 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 and catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors.



**259. Advanced Engineering Mathematics (4) I.**

The Staff

Lecture—4 hours. Prerequisite: Mathematics 22A, 22B, 21D. 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.

**262. Transport Phenomena in Multiphase Systems (3) III.** Whitaker

Lecture—3 hours. Prerequisite: course 253C. Heat, mass, and momentum transfer in multiphase, multi-component 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.

**263. Rheology and Mechanics of Non-Newtonian Fluids (3) II.** Powell

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.

**265. Emulsions, Microemulsions and Bilayers (3) II.** Dungan

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.

**\*267. Advanced Process Control (3) III.**

The Staff

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.

**289A-L. Special Topics in Chemical Engineering (1-5) I, II, III.** The Staff

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.

**290. Seminar (1) I, II, III.** The Staff

Seminar—1 hour. (S/U grading only.)

**290C. Graduate Research Group Conference**

(1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.)

**293. Graduate Student Seminar (1) I, II, III.**

The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: graduate standing. Presentation by graduate students of research in progress. May be repeated for credit. (S/U grading only.)

**294. Current Progress in Biotechnology (1) I, II, III.** Ryu, Doi

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.)

**298. Group Study (1-5) I, II, III.** The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff

(Chairperson in charge)

(S/U grading only.)

**Professional Course****390. Teaching of Chemical Engineering (1) I, II, III.** The Staff

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 twice for credit. (S/U grading only.)

**Courses in Materials Science and Engineering (EMS)****Upper Division Courses****130. Thermodynamics of Materials Processes (3) I.** Risbud

Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, semiconduction, thermoelectric power and thermionic energy conversion. GE credit: Wrt.

**132. Structure of Engineering Materials (3) I.** Howitt

Lecture—3 hours. Prerequisite: Engineering 45; upper division standing. Structure of engineering materials on the atomic scale will be described by exploring the fundamentals of crystallography. The importance of this structure to materials' properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques. GE credit: Wrt.

**132L. Structure and Testing of Materials****Laboratory (2) I.** Shackelford, Howitt

Laboratory—6 hours. Prerequisite: course 132 (concurrent enrollment recommended). Experimental investigations of structure of solids are combined with techniques for testing and evaluation. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray, electron, and ultrasonic techniques.

**134. Rate Processes in Materials Science (3) II.** Groza

Lecture—3 hours. Prerequisite: Engineering 45 or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporation, and sintering processes.

**134L. Rate Processes in Materials Laboratory****(2) II.** Groza

Laboratory—6 hours. Prerequisite: course 134 (concurrent enrollment recommended). Laboratory experiments to illustrate the fundamental principles of diffusion, solidification, recrystallization, precipitation, evaporation, sintering and phase transformations in materials. Materials behavior in high-temperature and corrosive environments will be emphasized.

**138. Mechanical Behavior of Materials (3) III.**

Mukherjee

Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic aspects of the mechanical behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined. GE credit: Wrt.

**138L. Mechanical Properties Laboratory (2) III.**

Mukherjee

Laboratory—6 hours. Prerequisite: course 138 (concurrent enrollment recommended). Experimental investigations of the mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationships between microstructure and mechanical properties.

**140. Materials in Engineering Design (3) III.**

The Staff

Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Quantitative treatment of materials selection for engineering applications. Discussion of the relationship of design parameters and materials properties. Emphasis on the processing and fabrication of metals, ceramics, polymers, and composites as related to the overall design process. GE credit: Wrt.

**142. Principles of Nondestructive Testing (3) II.** Shackelford

Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing using radiological, ultrasonic, electrical, magnetic, penetrant methods, etc., are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical in homogeneity, residual stress analysis, etc., are emphasized. GE credit: Wrt.

**144. Corrosion and Oxidation of Engineering Materials (3) II.** The Staff

Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

**146. Electronic and Optical Materials****Processing (3) III.** Groza

Lecture—3 hours. Prerequisite: upper division standing in Engineering, Physics, Chemistry, or Geology. Principles of phase equilibria, thermodynamics and reaction kinetics applied to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms. GE credit: Wrt.

**147. Principles of Polymer Materials Science****(3) II.** The Staff

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.)

**148. Failure Analysis (4) III.** The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 45, 104A; course 138 and Mechanical Engineering 150A recommended. Fracture mechanics and failure mechanisms in metals, ceramics, and composites. Effects of fatigue, corrosion and wear. Methodology for investigating failure including optical microscopy, scanning electron microscopy and destructive testing. GE credit: Wrt.

**149. Materials Engineering Design Project (3) I,****II, III.** The Staff

Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing in Engineering and consent of instructor. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

**155. Manufacturing Process Design (3) I.** Groza

Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 45 or Mechanical Engineering 50. Principles of materials processing and manufacturing properties, effects of processing variables on structure-property relationships, and the fundamentals of manufacturing process selection are described. Case histories are used to explore recent developments in manufacturing process design.

**190C. Research Group Conferences (1) I, II, III.**

The Staff

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.)



**198. Directed Group Study** (1-5) I, II, III.

The Staff

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****\*230. Fundamentals of Electron Microscopy** (3) II. Howitt

Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 132. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials. Emphasis upon practical applications. Offered in alternate years.

**\*230L. Laboratory for Electron Microscopy** (2) II. Jones

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.

**232. Advanced Topics in Transmission Electron Microscopy** (3) II. Howitt

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.

**232L. Laboratory for Advanced Transmission Electron Microscopy** (2) II. The Staff

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232 concurrently. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in alternate years.

**240. Transport Phenomena in Materials Processes** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and atomistic mechanisms in transport processes in condensed and noncondensed phases. Application to heat treatment, chemical and physical vapor deposition, crystal growth, bonding, sintering and joining of metals. Offered in alternate years.

**\*241. Principles and Applications of Dislocation Mechanics** (4) II. Mukherjee

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.

**242. Advanced Mechanical Properties of Materials** (4) II. Mukherjee

Lecture—3 hours; discussion—1 hour. Prerequisite: course 138. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress, and temperature. Generalized concepts of dislocation theory in plastic deformation, including creep, superplasticity, and cavitation. Influence of microstructure in optimizing the mechanical strength properties. Offered in alternate years.

**\*243. Kinetics of Phase Transformation in Engineering Materials** (3) III. Groza

Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 130 recommended. Theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in alternate years.

**244. Interaction of Materials and their Environment** (3) I. Munir

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.

**245. Advanced Topics in Structure of Materials** (4) III. Shackelford

Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering or consent of instructor; courses 138 and 142 recommended. Nature of microstructure in engineering materials will be explored. Crystalline and non-crystalline structures will be studied with special emphasis on grain boundary segregation in development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in alternate years.

**\*246. Current Topics in Electronic Materials Processing** (3) III. Navrotsky

Lecture—3 hours. Prerequisite: course 146; graduate standing in physical sciences or engineering. Discussion of current literature and topical areas related to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms. Offered in alternate years.

**\*247. Advanced Thermodynamics of Solids** (3) I. Munir

Lecture—3 hours. Prerequisite: course 130 or the equivalent. Thermodynamics of gas-solid reactions and solutions; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in alternate years.

**\*248. Fracture of Engineering Materials** (3) I. Gibeling

Lecture—3 hours. Prerequisite: course 138. Description of 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.

**249. Mechanisms of Fatigue** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of 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.

**250A-F. Special Topics in Polymer and Fiber Science** (3) II. The Staff

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.)

**251. Applications of Solid State Nuclear Magnetic Resonance Spectroscopy** (3) III.

Risbud

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.

**290C. Graduate Research Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**294. Materials Science Seminar** (1) I, II, III.Shackelford, Mukherjee, Munir, Howitt, Gibeling, Groza, Risbud  
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. (S/U grading only.)**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)**299. Research** (1-12) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course****390. The Teaching of Materials Science** (1) I, II, III. The Staff (Chairperson in charge)

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 twice for credit. (S/U grading only.)

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## Engineering: Civil and Environmental

(College of Engineering)

Daniel P.Y. Chang, Ph.D., Chairperson of the Department (530-752-2537)

Department Office, 116 Everson Hall (530-752-0586)

World Wide Web:

<http://www.engr.ucdavis.edu/~cedept/>**Faculty**

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Takashi Asano, Ph.D., Adjunct Professor

John Bolander, Ph.D., Assistant Professor

Ross W. Boulanger, Ph.D., Assistant Professor

Y. K. (Rob) Chai, Ph.D., Assistant Professor

Daniel P. Y. Chang, Ph.D., Professor

Yannis F. Dafalias, Ph.D., Professor

Jeannie L. Darby, Ph.D., Associate Professor, *Academic Senate Distinguished Teaching Award*

Johannes J. DeVries, Ph.D., Lecturer

Timothy R. Ginn, Ph.D., Acting Associate Professor

Leonard R. Herrmann, Ph.D., Professor, *Academic**Senate Distinguished Teaching Award,**UC Davis Prize for Teaching and Scholarly**Achievement*

I.M. Idriss, Ph.D., Professor

Roy A. Imbsen, D.E., Adjunct Professor

M. Levent Kavvas, Ph.D., Professor

Ian P. King, Ph.D., Professor

Bruce L. Kutter, Ph.D., Professor

Bruce E. Larock, Ph.D., Professor

Jay R. Lund, Ph.D., Professor

Miguel A. Mariño, Ph.D., Professor (*Civil and Environmental Engineering; Land, Air and Water Resources*)

Brian Maroney, D.Eng., Adjunct Professor

Patricia L. Mokhtarian, Ph.D., Associate Professor

Debbie Niemeier, Ph.D., Assistant Professor

Glaucio Paulino, Ph.D., Assistant Professor

Melvin R. Ramey, Ph.D., Professor

Mark M. Rashid, Ph.D., Associate Professor

Karl M. Romstad, Ph.D., Professor, *Academic Senate**Distinguished Teaching Award*Edward D. Schroeder, Ph.D., Professor, *Academic**Senate Distinguished Teaching Award*

S. Geoffrey Schladow, Ph.D., Associate Professor

Robert Smith, Ph.D., Lecturer

Daniel Spering, Ph.D., Professor (*Civil and**Environmental Engineering; Environmental**Science and Policy*)

Fred Stephenson, M.S., Lecturer

Thomas M. Young, Ph.D., Assistant Professor

**Emeriti Faculty**

Don O. Brush, Ph.D., Professor Emeritus

Robert H. Burgy, M.S., Professor Emeritus

James A. Cheney, Ph.D., Professor Emeritus

James R. Hutchinson, Ph.D., Professor Emeritus

Ray B. Krone, Ph.D., Professor Emeritus

Gerald T. Orlob, Ph.D., Professor Emeritus

Otto G. Raabe, Ph.D., Professor Emeritus  
 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

## Courses in Engineering: Civil and Environmental (ECI)

### Lower Division Courses

**1. The Civil Engineer in Society** (1) I. The Staff (Chairperson in charge)

Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

**3. Introduction to Civil and Environmental Engineering Systems** (3) I. Ramey

Lecture—2 hours; laboratory—3 hours. Prerequisite: trigonometry. Introduction to civil engineering systems. General view of the engineering process as obtained by participation in laboratory experiments illustrative of the solution of representative, but greatly simplified, engineering problems. GE credit: SciEng.

**10. Introduction to Surveying** (3) III. Smith

Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves; calculations for latitude, longitude, azimuth; earthwork computations.

**90X. Lower Division Seminar** (1-4) I, II, III.

The Staff

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

### Upper Division Courses

**114. Probabilistic Systems Analysis for Civil Engineers** (3) I, II. Mokhtarian

Lecture—3 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.

**130. Structural Analysis** (4) III. Romstad  
 Lecture—4 hours. Prerequisite: Mathematics 22A, Engineering 104. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis.

**131. Matrix Structural Analysis and Introduction to Finite Element** (3) I. Ramey

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 5 (or the equivalent) and 104. Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Introduction to finite element methods for elasticity and bending problems. (Former course 131B.)

**132. Structural Design: Metallic Elements** (3) II. Ramey

Lecture—3 hours. Prerequisite: Engineering 104 (may be taken concurrently). Metallic beams, columns, other members; analysis and design of bolted and welded joints; design of simple beam connections, moment resistant connections, and column base plates. (Former course 132A.)

**134. Analysis and Design of Bridges** (4) II. Imbsen

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 130 or 131, and 135. Bridge design and analysis utilizing current state-of-the-art computer programs. Overview of Caltrans and American Association of State Highway and Transportation Officials (AASHTO) codes and principles. Seismic analysis and retrofitting of bridges. Bridge design details and final plans, specifications and estimate.

**135. Structural Design: Concrete Elements** (4) I, III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104 (may be taken concurrently). 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.

**136. Building Design: Wood, Steel, and Concrete Applications** (4) III. Ramey

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** (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in Engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

**138. Earthquake Loads on Structures** (3) II. Romstad

Lecture—3 hours. Prerequisite: Engineering 102, course 130 or 131. Determination of loads on structures due to base motions. Methods of static lateral forces, approximate dynamic analysis (response spectrum), and time history. Concepts of mass, damping, and stiffness for typical structures. Design for inelastic behavior. Consideration of wind and blast loading.

**139. Advanced Structural Mechanics** (3) I. Rashid

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.

**140. Environmental Analysis of Aqueous Systems** (3) I. Darby

Lecture—3 hours. Prerequisite: Chemistry 2B; course 148A recommended. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater.

**140L. Environmental Analysis of Aqueous Systems Laboratory** (1) I. Darby

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) I, III. Larock

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag.

**141L. Engineering Hydraulics Laboratory** (1) I, III. Larock

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.

**142. Engineering Hydrology** (3) I. Kavvas

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently); course 114 recommended. Study of the hydrologic cycle. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

**143. Bioremediation Principles** (3) III. Schroeder

Lecture—3 hours. Prerequisite: course 148A or the equivalent. Introduction to bioremediation of contaminated soils and groundwater. Site characterization, microbial processes, in situ and on-site treatment methods. Introduction to bioremediation systems design.

**144. Groundwater Systems Design** (3) I. Kavvas

Lecture—3 hours. Prerequisite: course 141. Groundwater occurrence, distribution, and movement; well-flow systems; design of wells; groundwater quality and contamination; aquifer management. Introduction to groundwater modeling.

**145. Hydraulic Structure Design** (3) III. DeVries

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 141 and 141L; course 142 recommended. Principles of project design. Methods of analysis and hydraulic design of storage systems, conveyance and regulation systems, and hydraulic structures. Emphasis is on application of principles of open channel hydraulics in these systems.

**146. Water Resources Simulation** (3) II.

Schladow

Lecture—3 hours. Prerequisite: courses 141; 114 and 142 recommended. Simulation techniques in the analysis, design and operation of surface water systems; introduction to modeling concepts with particular application to surface runoff; water quality in rivers and streams; and management of reservoirs. GE credit: Wrt.

**147. Solid Waste Management** (3) I.

Tchobanoglous

Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment.

**148A. Water Quality Management** (3) II, III.

Schroeder

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Introduction to basic concepts of water quality. Fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.

**148B. Water Quality Management Systems Design** (3) III. Tchobanoglous

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

**149. Introduction to Air Pollution** (4) I. Carroll

(Land, Air and Water Resources). Chang, Raabe  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B, 21D, Chemistry 2B; Atmospheric Science 121A or Engineering 103A. Examination of 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.)

**150. Air Pollution Control System Design** (4) II. Chang

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Engineering 103A, 105A and 106 or the equivalents; course 149 or the equivalent recommended. Introduction to the design and evaluation of air pollution control devices and systems.

**153. Deterministic Optimization and Design** (4) II. Lund

Lecture—4 hours. Prerequisite: Mathematics 21C and 22A, Engineering 5 or the equivalent; Applied Science Engineering 115 recommended. Introduction to operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in water resources planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.

**155. Water Resources Engineering Planning** (4) III. Lund

Lecture—4 hours. Prerequisite: Engineering 106 or Economics 1A, course 114 or the equivalent, course 142; course 153 recommended. Basic water resources engineering planning concepts; role of engineering, economic, environmental and social information; institutional, political and legal aspects. Case studies will illustrate the planning of water resource systems. GE credit: Wrt.

**160. Introduction to Transportation Planning** (4) I. Sperling

Lecture—3 hours; discussion—1 hour. Prerequisite: any two of Geography 5, Economics 1A, or 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. GE credit: SocSci, Wrt.

**161. Transportation System Operations** (3) II. Jovanis

Lecture—3 hours. Prerequisite: Engineering 36. Principles of transportation system operations; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban streets and freeways.

**162. Transportation System Design** (3) III. Jovanis

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 160 or 161 or 163. Human vehicle and guideway factors and their relationship to transportation system design. Generalized design paradigm; application to large scale group problem solving.

**163. Energy and Environmental Aspects of Transportation** (3) II. Sperling

Lecture—3 hours. Prerequisite: course 160. 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.) GE credit: Wrt.

**171. Soil Mechanics** (4) II, III. Kutter

Lecture—4 hours. Prerequisite: Engineering 103A, 104 (may be taken concurrently), course 10, course 171L concurrently. Restricted to Civil Engineering majors. 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.

**171L. Soil Mechanics Laboratory** (1) II, III. Kutter

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.

**173. Foundation Design** (4) I. Idriss

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 de-watering.

**174. Environmental Geotechnology** (3) III. Arulanandan

Lecture—3 hours. Prerequisite: courses 148A and 171. Soil and site characterization in relation to natural and man-made hazards, waste containment, and waste site remediation techniques.

**176. Geotechnical Modeling** (3) I. Kutter

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A and course 171. Dimensional analysis similarity and the theory of models. Applications to soil mechanics and solid mechanics. Instrumentation, calibration, computer-aided data reduction and recording. Experiments demonstrating basic principles including vibration of beams, centrifuge modeling of building foundations and seepage.

**189A-J. Selected Topics in Civil Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)

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) Analysis and Design of Bridges; (F) Building Design: Wood, Steel and Concrete Applications; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit when the topic is different.

**190C. Research Group Conferences in Civil and Environmental Engineering** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**192. Internship in Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

**Graduate Courses****201. Introduction to Theory of Elasticity** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes. Introduction to variational and approximate methods.

**\*203. Inelastic Behavior of Solids** (3) III. Dafalias

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.

**205. Continuum Mechanics** (3) II. Dafalias

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.

**206. Fracture Mechanics** (3) II. Paulino

Lecture—3 hours. Prerequisite: Engineering 104; course 201 recommended. 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.

**211. Advanced Matrix Structural Analysis** (3) II. Romstad

Lecture—3 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.

**212A. Finite Element Procedures in Applied Mechanics** (3) II. Rashid

Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128A-128B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures; Galerkin and stationary principle methods. Construction of approximate solutions by the finite element method. Applications to one- and two-dimensional problems in engineering. Introduction to time dependent, non-linear and three-dimensional problems, and other approximation procedures.

**212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems** (3) III. Herrmann

Lecture—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and non-linear, one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and plate and shell theories.

**212C. Finite Elements: Application to Fluid Problems** (3) III. Larock

Lecture—3 hours. Prerequisite: courses 141, 212A. Application of the finite element method to two- and three-dimensional fluid flow problems, including inviscid and viscous flow, convection-diffusion problems, the shallow water equations, and flow through porous media. Class lectures and independent study and projects. Offered in alternate years.

**213. Analysis of Structures Subjected to Dynamic Loads** (3) III. Romstad

Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake, wind, and blast loading; distributed, consistent and lumped mass techniques; development of a computer program for complex structures; nonlinear response spectrum analysis; frequency and time domain analysis.

**221. Theory of Plates and Introduction to Shells** (3) I. Herrmann

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** (3) I. Ramey

Lecture—3 hours. Prerequisite: course 135. Ductility of reinforced concrete; design for torsion of structural concrete; seismic requirements; two-way slabs.

**233. Advanced Design of Steel Structures** (3) II. Ramey

Lecture—3 hours. Prerequisite: courses 130 and 132. Design considerations for steel column and frame buckling; steel-plate girder design; steel-concrete composite design; design of connections. Design basis follows AISC, LRFD, and ASD specifications.

**\*234. Prestressed Concrete** (3) I. Bolander

Lecture—3 hours. Prerequisite: course 130 or 131; 135. Survey of methods and applications; prestressing materials and systems; estimation of prestress losses; flexural design; design for shear and torsion; deflection and crack control; continuous beams and indeterminate structures; floor systems; introduction to partial prestressing. Offered in alternate years. (Not open to students who have taken course 139 prior to spring 96.)

**235. Cement Composites** (3) I. Bolander

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104. Survey of applications; 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; applications to structural



## 240 Engineering: Civil and Environmental

design. Offered in alternate years. (Not open to students who have taken course 133.)

### 240. Water Quality (3) II. The Staff

Lecture—3 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 ground-waters; transport and fate of waterborne pollutants. Predictive methods, introduction to water quality modeling.

### \*242. Air Quality (3) III. Chang

Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 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.

### 243A. Water and Waste Treatment (3) I.

Schroeder

Lecture—3 hours. Prerequisite: course 148A. Characteristics of waterborne and airborne wastes; treatment processes and process kinetics; treatment system design.

### 243B. Water and Waste Treatment (3) II.

Schroeder

Lecture—3 hours. Prerequisite: course 243A; consent of instructor. Continuation of course 243A.

### 244. Environmental Quality Modeling (3) I.

The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 240 or 242A. Mathematical modeling of environmental water quality, with emphasis on mathematical models of water quality, their structure, capabilities and limitations, sensitivity and reliability as analytical and/or predictive tools. Offered in alternate years.

### \*245A. Applied Environmental Chemistry: Inorganic (4) III. Young

Lecture—4 hours. Prerequisite: Engineering 105A, course 140 and 140L, Chemistry 2A, 2B or the equivalent; 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.

### 245B. Applied Environmental Chemistry: Organic (3) III. Young

Lecture—3 hours. Prerequisite: Chemistry 128A, 128B, 128C or the equivalent. 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.

### 246. Pilot Plant Laboratory (3) II. Darby

Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

### 247. Airborne Particles and Scavenging Mechanisms (3) I. The Staff

Lecture—3 hours. Prerequisite: Engineering 105A and 103A, and courses 141, 149. Generation, characterization and behavior of small particles and droplets suspended in gas, including deposition and scavenging of airborne particles in the earth's atmosphere. Offered in alternate years. (Former course 242B.)

### 247L. Airborne Particles Laboratory (1) I.

The Staff

Laboratory—3 hours. Prerequisite: course 247 (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods generation and characterization of airborne particles. Offered in alternate years. (Former course 242BL.)

### 248A. Design of Natural Systems for Wastewater Treatment (3) III. Smith

Lecture—3 hours. Prerequisite: courses 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewaters. Emphasis is

placed on the practical application of principles developed in core courses 243A and 243B plus new information related to natural systems. Offered in alternate years.

### \*248B. Wastewater Reclamation and Reuse: Theory and Practice (3) III. Asano

Lecture—3 hours. Prerequisite: course 243A, 243B. Wastewater reuse in water resources planning. Wastewater reuse practices in agricultural and landscape irrigation, industry, groundwater recharge, recreational and environmental uses, and potable water reuse. Selection of reclamation technologies. Assessment of health risks and health risk mitigation. Offered in alternate years.

### \*249. Probabilistic Design and Optimization (3) III. Lund

Lecture—3 hours. Prerequisite: Engineering 106; courses 114 and 153 or the equivalent. 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.

### \*250. Urban Transportation and Land Use Policy and Planning (3) I. Mokhtarian

Lecture—3 hours. Prerequisite: course 251. Historical and current relationships between transportation and land use. Traditional land use models. Role of land use in urban transportation modeling. Relationship between energy consumption and urban form. Impact of telecommunications on urban form. Policies involving transportation/land use relationships. Offered in alternate years.

### 251. Transportation Demand Analysis (3) II.

The Staff

Lecture—3 hours. Prerequisite: course 114 or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the model components (trip generation, trip distribution, and modal split). Computer exercises using empirical data to calibrate models and forecast travel demand.

### 252. Sustainable Transportation Technology and Policy (3) III. Sperling

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. Offered in alternate years. (Same course as Environmental Science and Policy 252.)

### 253. Transportation Safety Analysis (3) III.

Jovanis

Lecture—3 hours. Prerequisite: courses 114, 254. Human and vehicle factors in accident occurrence. Evaluation of safety investments; regression to the mean. Development of statistical models of accident occurrence.

### 254. Discrete Choice Analysis of Travel Demand (3) III. Mokhtarian

Lecture—3 hours. Prerequisite: course 114 or the equivalent. 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 large-scale data sets obtained from home interview surveys.

### 255. Transportation Survey Methods (3) II.

Mokhtarian

Lecture—3 hours. Prerequisite: course 251 or consent of instructor. Description of types of surveys commonly used in transportation demand modeling, including home-interview, travel diary, panel, attitudinal, conjoint, and stated-preference surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant, cluster, conjoint, and stated-preference analysis.

### 256. Urban Traffic Management and Control I

(3) II. Jovanis

Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicular traffic congestion; roadway capacity; intersection design and traffic signal operations; freeway operations and management; corridor control.

### \*258. Transportation Planning in Developing Countries (3) III. Sperling

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.

### 259. Advanced Highway Technology and Automation (3) I. Jovanis

Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of policy implementation issues, driver response and pricing strategies and costs, and formulation of control theory.

### \*260. Noncohesive Sediment Transportation (3) II. The Staff

Lecture—3 hours. Prerequisite: course 141. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Bed load relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in alternate years.

### \*261. Cohesive Particle Transportation (3) III. The Staff

Lecture—3 hours. Prerequisite: course 141. Cohesion; cohesive particulate materials; processes of aggregation and dispersion; aggregate properties; deposition and scour, channel and harbor design and maintenance. Offered in alternate years.

### 262. Transit Systems Analysis (3) I. Niemeier

Lecture—3 hours. Prerequisite: course 251. Theoretical presentation of transit planning and analysis techniques. Five modules: policy and funding; management and operations; design standard and issues; planning and forecasting methods for performance evaluation. Review of transit studies from other regions. Offered in alternate years.

### 263. Transportation Economics (3) I. Niemeier

Lecture—3 hours. Prerequisite: Engineering 106. Benefit cost theory and application. Introduction to price theory and application in transportation. Discussion of measures of welfare loss and applications in transportation. Includes local, regional, and World Bank studies.

### 264A. Transport, Mixing and Water Quality in Rivers and Lakes (3) III. Schladow

Lecture—3 hours. Prerequisite: courses 141 and 240. Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of California lakes and rivers. Offered in alternate years.

### \*264B. Transport, Mixing and Water Quality in Estuaries and Wetlands (3) III. Schladow

Lecture—3 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. San Francisco Bay case study. Offered in alternate years.

### 265. Stochastic Contaminant Transport (3) II. Kavvas

Lecture—3 hours. Prerequisite: course 266A. The stochastic theory of molecular diffusion will be covered by means of Taylor-Chandrasekhar theory. Turbulence diffusion will be covered in the Lagrangian-Eulerian frameworks. The theory will be applied to contaminant transport in groundwater aquifers, atmosphere, river and oceanic environments. Offered in alternate years.



**266A. Applied Stochastic Methods in Engineering (3) I.** Kavvas

Lecture—3 hours. Markov processes and their applications to modeling of engineering systems. Review of differential Smolukowski-Chapman-Kolmogorov equations, Brownian motion and Ornstein-Uhlenbeck processes within the framework of statistical diffusion theory and their engineering applications to pollution transport problems.

**\*266B. Applied Stochastic Methods in Engineering (3) II.** Kavvas

Lecture—3 hours. Stochastic differential equations and their applications to the solution of engineering problems. Offered in alternate years.

**267. Water Resources Management (3) I.** Lund

Lecture—3 hours. Prerequisite: basic probability (course 114 or the equivalent) and courses 141 and 142; course 153 recommended. Operation, maintenance, and modification of existing water resource systems; engineering, economic, financial, legal, and institutional considerations; decision, optimization, and multi-objective analysis.

**268. Public Works Economics (3) II.** Lund

Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural and Resource Economics 148; Economics 1A. Engineering economics applied to public works planning, operations, and maintenance problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.

**270. Advanced Water Resources Management (3) III.** Lund

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.

**\*271. Water Resources Planning Laboratory (3) III.** The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lectures provide instruction on principles and methodology used in the laboratory study. Offered in alternate years.

**272A. Advanced Groundwater Hydrology (3) II.** Mariño

Lecture—3 hours. Prerequisite: course 144 or the equivalent; Mathematics 118A recommended. Flow in confined, unconfined, and leaky aquifers. Hydraulics of pumping and recharging wells. Identification of aquifer parameters. Groundwater quality problems.

**\*272B. Advanced Groundwater Hydrology (3) III.** King

Lecture—3 hours. Prerequisite: courses 272A and 212A or the equivalent. Numerical methods of fluid flow systems. Flow in the unsaturated zone. Hydrodynamic dispersion. Fresh-water and salt-water interface in coastal aquifers. Identification of regional aquifer parameters. Modeling of aquifer systems. Offered in alternate years.

**273. Water Resource Systems Engineering (3) I.** Mariño

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.

**\*274. Hydraulics of Pipe Lines (3) II.** Larock

Lecture—3 hours. Prerequisite: course 141; Engineering 5. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Manifold flow. Offered in alternate years.

**275. Hydrologic Time-Series Analysis (3) III.**

Kavvas

Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. 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.

**276. Watershed Hydrology (4) II.** Kavvas

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.

**277. Unsteady Flow in Surface Waters (3) I.**

King

Lecture—3 hours. Prerequisite: course 141; Applied Science Engineering 115 (may be taken concurrently). Long waves in surface flow. Shallow water equations. Saint Venant equations. Method of characteristics. Explicit and implicit finite element methods; stability of numerical schemes. Flood routing. Bores. Dam break.

**278. Hydrodynamics (3) II.** Larock

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.

**279. Advanced Mechanics of Fluids (4) I.**

Larock

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.

**281A. Advanced Soil Mechanics (3) I.** Idriss

Lecture—3 hours. Prerequisite: course 171. Consolidation and secondary compression. Seepage and seepage pressures. Shear strength: friction, cohesion, dilatancy, and critical states.

**281B. Advanced Soil Mechanics (3) II.** Kutter

Lecture—2 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. Centrifuge modeling.

**283. Physico-Chemical Influences and In Situ Evaluation of Soil Behavior (3) I.** Arulanandan

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange. Soil-water-electrolyte characteristics and soil structure. Laboratory includes methods of characterization of soils, quantification of soil structure, and rotating cylinder tests to evaluate soil erosion.

**284. Theoretical Soil Mechanics (3) II.** Kutter

Lecture—3 hours. Prerequisite: courses 171, 281A. Elasticity, plasticity, and critical state soil mechanics. Prediction of stress-strain-volume change behavior of soils. Monotonic and cyclic loading, anisotropy, and strain-rate effects. Numerical implementation of constitutive models.

**285A. Soil Modification (3) I.** Idriss

Lecture—3 hours. Prerequisite: course 171. Purposes, principles, and methods of soil modification for various geotechnical applications. Offered in alternate years.

**\*285B. Pavement Systems Design (2) I.**

Arulanandan

Lecture—2 hours. Prerequisite: course 171. Principles and methods of pavement design for highways and airfields. Offered in alternate years.

**286. Advanced Foundation Design (3) III.** Idriss

Lecture—3 hours. Prerequisite: course 173. Design and analysis of bulkheads; deep excavation; tie-back systems; coffer dams; loads on buried conduits; lat-

eral pile loading capacity; pier foundations; and other related topics.

**287. Geotechnical Earthquake Engineering (3) III.** Idriss

Lecture—3 hours. Prerequisite: course 138; course 281A or consent of instructor. Characteristics of earthquake ground motions; empirical and simulation procedures for estimating these motions; local site response; liquefaction potential; residual strength and stability considerations; generation and dissipation of pore water pressures; settlement.

**288. Earth and Rockfill Dams (3) II.** Idriss

Lecture—3 hours. Prerequisite: courses 281A, 281B. Site selection; preliminary design considerations; layout; seismic effects including considerations of fault movements; construction; instrumentation; maintenance.

**289A-I. Selected Topics in Civil Engineering (1-5) I, II, III.** The Staff (Chairperson in charge)

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. May be repeated for credit.

**290. Seminar (1) I, II, III.** The Staff (Chairperson in charge)

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.)

**290C. Graduate Research Group Conference (1) I, II, III.** Chairperson in charge

Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Course****390. The Teaching of Civil Engineering (1) I, II, III.** The Staff (Chairperson in charge)

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.)

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## Engineering: Computer Science

(College of Engineering)

Biswanath Mukherjee, Ph.D., Chairperson of the Department

Ronald A. Olsson, Ph.D., Vice Chairperson of the Department

Department Office, 2063 Engineering II (530-752-7004)

World Wide Web: <http://www.cs.ucdavis.edu>**Faculty**

Matthew Bishop, Ph.D., Associate Professor  
 Frederic T. Chong, Ph.D., Assistant Professor  
 Premkumar T. Devanbu, Ph.D., Assistant Professor  
 Matthew K. Farrens, Ph.D., Associate Professor  
 Michael Gertz, Ph.D., Assistant Professor  
 Dipak Ghosal, Ph.D., Assistant Professor

Daniel Gusfield, Ph.D., Professor  
 Bernd Hamann, Ph.D., Associate Professor  
 Kenneth I. Joy, Ph.D., Associate Professor,  
*Academic Senate Distinguished Teaching Award*

Alan L. Laub, Ph.D., Professor (*Computer Science, Electrical and Computer Engineering*)

Karl Levitt, Ph.D., Professor  
 Charles U. Martel, Ph.D., Professor  
 Norman S. Matloff, Ph.D., Professor  
 Biswanath Mukherjee, Ph.D., Professor  
 Ronald A. Olsson, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Raju Pandey, Ph.D., Assistant Professor  
 Phillip Rogaway, Assistant Professor  
 Manfred G. Ruschitzka, Ph.D., Professor  
 Richard F. Walters, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

### Emeriti Faculty

Lawrence T. Kou, Ph.D., Professor Emeritus  
 Peter Linz, Ph.D., Professor Emeritus

### Affiliated Faculty

Sean Davis, M.S., Lecturer  
 Evan Fletcher, Ph.D., Lecturer  
 Nancy E. Reed, Ph.D., Adjunct Assistant Professor  
 Stuart Staniford-Chen, Ph.D., Adjunct Assistant Professor  
 Frank A. Stomp, Ph.D., Adjunct Assistant Professor

## Courses in Engineering: Computer Science (ECS)

### Lower Division Courses

#### 10. Basic Concepts of Computing (4) II.

The Staff

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 intended for students in physical sciences, engineering, or mathematics. Not open for credit to students who have completed course 30 or 35, Engineering 5, or former course 30H.

**15. Introduction to Computers (4) I,II,III.** Walters  
 Lecture—3 hours; laboratory—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, other applications, elementary programming concepts, overview of current/projected computer uses. Intended for Letters and Science and other non-computer majors. Not open for credit to students who have completed course 15AT, 30, 35, Engineering 5 or former course 30H. Only 2 units of credit allowed to students who have completed Agricultural Systems and Environment 21. GE credit: SciEng, Wrt.

**15AT. Introduction to Computers (4) I.** Walters  
 Independent study—4 hours. Prerequisite: consent of instructor. Computer uses in modern society. Includes word processing, spreadsheet, DOS, networks and programming concepts. Independent study course paralleling course 15 lectures. Not open to students who have completed course 15, 30, 35, or Engineering 5. Only 2 units of credit allowed to students who have completed Agricultural Systems and Environment 21. GE credit: SciEng, Wrt.

**20. Discrete Mathematics for Computer Science (4) I, II, III.** Gusfield, Levitt, Martel, Rogaway

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21C. 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 taken ECS 100.

**30. Introduction to Programming and Problem Solving (4) I, II, III.** Ruschitzka

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. Not open for credit to students who have completed course 35.

**\*35. Structure and Interpretation of Computer Programs (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science or Electrical Engineering major, Mathematics 16A or 21A (may be taken concurrently), knowledge of Pascal or C. Mathematical foundations of computer science. Procedural and data abstraction. Design and analysis of algorithms. The Scheme programming language is used. Not open for credit to students who have completed course 10, 30, Engineering 5, or former course 30H. Intended for students who have been introduced to a high-level programming language in high school.

**40. Introduction to Software Development and Object-Oriented Programming (4) I, II, III.**

The Staff

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.

**50. Computer Organization and Machine-Dependent Programming (4) II, III.** Farnens, Matloff

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.

**89A-L. Special Topics in Computer Science (1-5) I, II, III.** The Staff (Chairperson in charge)

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.

**90X. Lower Division Seminar (2) I, II, III.**

The Staff (Chairperson in charge)

Seminar—2 hours. Prerequisite: lower division standing. Examination of a special topic in a small group setting.

**92. Internship in Computer Science (1-5) I, II, III.** The Staff

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) I, II, III.** The Staff (Chairperson in charge)  
 (P/NP grading only.)

**99. Special Study for Lower Division Students (1-5) I, II, III.** The Staff (Chairperson in charge)  
 (P/NP grading only.)

### Upper Division Courses

**110. Data Structures and Programming (4) I, II, III.** Martel, Joy, Rogaway

Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 or the equivalent (C++ and UNIX) with a grade of C- or better. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming.

**120. Introduction to the Theory of Computation (4) I, II.** Rogaway, Gusfield, Martel

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.

**122A. Algorithm Design and Analysis (4) II, III.**

Gusfield, Martel, Rogaway

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 110. Complexity of algorithms, bounds on complexity, algorithms for searching, sorting, pattern matching, graph manipulation, combinatorial problems, introduction to NP-complete problems. Not open for credit to students who have taken course 122.

**122B. Algorithm Design and Analysis (4) I.**

Gusfield, Martel, Rogaway

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.

**140A. Programming Languages (4) I, II.** Olsson, Pandey

Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70; course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, scoping, parameter disciplines, exception handling. Comparative study of several high-level programming languages. Not open for credit to students who have taken course 140.

**140B. Programming Languages (4) II.** Olsson, Levitt, Pandey

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.

**142. Compilers (4) III.** Pandey

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.

**150. Operating Systems and System Programming (4) I, III.** Levitt, Matloff, Olsson

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.

**151A. Operating System Design (4) II.**

Ruschitzka

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170. Architectural support of operating system concepts. Systems programming. Major components of an operating system, their functions, and their interactions. Lecture material is closely coupled with a project that involves a machine simulator and the implementation of a matching multi-programming system. Not open to students who have taken Electrical and Computer Engineering 182A.

**151B. Operating System Design (3) III.**

Ruschitzka

Lecture—3 hours. Prerequisite: course 151A and an introductory probability course. Contemporary architectures: virtual memory and operating system support functions. Concurrent processes and the problems of determinacy, mutual exclusion, deadlocks, and synchronization. Management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations. Not open to students who have taken Electrical and Computer Engineering 182B.

**152A. Computer Networks** (3) I, II, III.

Mukherjee, Matloff, Ghosal

Lecture—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170; course 110 or Electrical and Computer Engineering 173; Mathematics 131 or Statistics 131A or 120 or 32. Overview of local and wide-area networks. ISO seven-layer model. Physical aspects of data transmission. Data-link protocols multiplexing. Switched networks; broadcast networks. Internetworking. Not open for credit to students who have taken course 152.

**152B. Computer Networks** (3) II, III. Mukherjee, Ghosal

Lecture—3 hours. Prerequisite: course 152A; course 150 or 151A. Upper-layer protocols. Communications software. UNIX network programming. Transport layer interfaces. Sockets. TCP/IP. Applications. Remote procedure calls. Network management.

**153. Introduction to Computer Security** (4) III. Bishop

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150 or 151A-151B. Study of the 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. An existing operating system will be studied.

**154A. Computer Architecture** (4) I, II. Farrens, Matloff, Mukherjee, Chong

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.

**154B. Computer Architecture** (4) II, III. Farrens, Matloff, Chong

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.

**158. Programming on Parallel Architectures** (3) III. Farrens, Matloff

Lecture—3 hours. Prerequisite: course 154B or Electrical and Computer Engineering 170; and course 150 or 151A. Techniques for software development on shared-memory and message-passing architectures. Overview of interconnect architectures, and hardware for memory-access atomicity. Spin locks and barriers. Load balancing. Efficient use of interconnects and memory.

**160. Introduction to Software Engineering** (4) II, III. Levitt, Devanbu

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110, 140A. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming.

**163. User/Computer Interfaces** (4) III. Joy

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 110. Study of the principles of user/computer interaction. User interface management system architectures; semantics of input devices; transition network and event-based systems, models of interaction, graphical interfaces; implementations; and performance issues and tradeoffs.

**165A. Database Systems** (4) II. Walters, Gertz  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Database hardware; input techniques; file types; database models; reliability, integrity and security; operating system interfaces with databases.

**165B. Database Systems** (4) III. Walters, Gertz  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 165A. Continuation of basic principles of databases. Distributed systems; transaction processing; knowledge representation; new database models,

including object-oriented; performance evaluation; optimization.

**167. Databases in Humanities and Sciences** (4) III. Walters

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15 or the equivalent. Introduction for non-majors to basic principles of database management systems; overview of typical commercial database packages; use of database systems in various fields in humanities and sciences; design and implementation of individual database applications. Not open for credit to College of Engineering students. GE credit: SciEng, Wrt.

**\*168. Information Systems** (3) I. Walters

Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and case study evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in alternate years.

**170. Introduction to Artificial Intelligence** (4) II. Levitt

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110, 140A. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing.

**\*172. Natural Language Processing** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140A recommended. Introduction to cognitive modeling. Study of knowledge structures and processes required for computer comprehension of human languages. Conceptual analysis based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and generators.

**175. Introduction to Computer Graphics** (4) I, II. Joy, Hamann

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or Electrical and Computer Engineering 73; Mathematics 22A. 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.

**177. Introduction to Visualization** (4) II. Hamann, Joy

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.

**178. Introduction to Geometric Modeling** (4) III. Hamann, Joy, Max

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.

**188. Ethics and the Information Age** (3) II. The Staff

Seminar—2 hours; term paper. Prerequisite: senior standing. Ethics and professional responsibility issues as they are influenced by the growth of computer usage and networks in today's society.

**189A-L. Special Topics in Computer Science** (1-5) I, II, III. The Staff (Chairperson in charge)

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. May be repeated for credit when topic differs.

**190C. Research Group Conferences in Computer Science** (1) I, II, III. The Staff

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.)

**190X. Senior Seminar** (2) I, II, III. The Staff (Chairperson in charge)

Seminar—2 hours. Prerequisite: senior standing. Examination of a special topic in a small group setting.

**192. Internship in Computer Science** (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff

Discussion—1 hour; laboratory—3-6 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in computer science courses, especially introductory computing. For upper division undergraduate students who will provide tutorial assistance. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****220. Theory of Computation** (3) III. Rogaway

Lecture—3 hours. Prerequisite: course 120 and 122A. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability.

**222A. Design and Analysis of Algorithms** (3) I. Gusfield, Martel, Rogaway

Lecture—3 hours. Prerequisite: course 122A; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating. Search techniques. Graph algorithms.

**222B. Advanced Design and Analysis of Algorithms** (3) II. Gusfield, Martel, Rogaway

Lecture—3 hours. 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.

**223. Parallel Algorithms** (3) II. Martel

Lecture—3 hours. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are proved in several settings.

**224. String Algorithms and Applications in Computational Biology** (3) III. Gusfield

Lecture—3 hours. Prerequisite: course 122A. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and application, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Offered in alternate years.

**225. Graph Theory** (3) II. Hakimi

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.



**227. Modern Cryptography** (3) II. Rogaway  
Lecture—3 hours. 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.

**240. Programming Languages** (4) II. Pandey  
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.

**242. Translation of Programming Languages** (4) III. Pandey  
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.

**243. Code Generation and Optimization** (3) I. Pandey, Wilken  
Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code movement, loop optimization, common subexpression elimination, and peephole optimization. Optimization by program transformation.

**244. Principles of Concurrent Programming** (4) I. Olsson, Pandey  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; and course 150 or 151B. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

**247. Concurrent Programming Languages** (4) I. Pandey, Olsson  
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).

**250A. Advanced Computer Architecture** (4) I. Matloff  
Lecture—3 hours; term paper. Prerequisite: course 154B or Electrical and Computer Engineering 170; course 150 or 151A. Introduction to 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.

**250B. High-Performance Uniprocessing** (3) II. Farrens  
Lecture—3 hours. Prerequisite: course 250A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs.

**250C. Parallel Processing** (3) III. Chong  
Lecture—3 hours. Prerequisite: course 250A. Parallel architectures have evolved from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Readings of current research papers. Final paper and presentation critiquing three related readings and extending their area with a small project.

**251. Operating System Models** (4) III. Ruschitzka  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 151B; introductory probability theory course. A survey of formal models for the study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orderings and procedure relations. Deterministic and probabilistic

models for the evaluation of system performance. Pertinent programming project.

**252. Local and Metropolitan Area Networks** (4) II. Mukherjee  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152A. Local and metropolitan area networks, technologies, functions, structures, access protocols. Performance modeling and analysis of multi-access techniques in polling, ring, and random access networks. Standards, example products, high-speed LANs (FDDI), MANs (IEEE 802.6 DQDB), local light-wave networks.

**253. Cryptography and Data Security** (4) I. Levitt, Bishop  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150; consent of instructor. Methods of protecting data in computer and communication systems from unauthorized disclosure and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

**256A. Analytic Methods for Computer Systems Design** (3) I. B. Mukherjee, Matloff, Ghosal  
Lecture—3 hours. Prerequisite: course 100, 154A-154B or Electrical and Computer Engineering 170, and Statistics 131A or the equivalent; course 150 or 151A-151B recommended. Use of simulation and queueing theory in computer design. Applications to memory hierarchies; file storage; computer networks; fault-tolerance; scheduling.

**256B. High Speed Networks** (4) III. Ghosal, Mukherjee  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152A. Various issues in emerging high speed networks. Topics include network modeling, analysis, and optimization; routing; design of high speed switching fabrics; congestion control; traffic characterization; and broadband ISDN and ATM networks.

**260. Software Engineering** (4) I. Devanbu, Levitt  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 140A and 160. Advanced techniques for program specification, design, rapid prototyping, optimized implementation, testing, validation, documentation, maintenance through the lifecycle. Each student will produce informal requirements, formal design specifications, a rapid prototype, test plan, optimized implementation, plan for maintaining the system over the lifecycle.

**261. Program Verification** (4) I. Levitt  
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.

**\*262. Formal Specification** (3) II. Levitt  
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.

**265. Database Systems** (3) III. Walters, Gertz  
Lecture—3 hours. Prerequisite: course 165A. Data models (especially relational and entity relation), performance measures, query languages and optimizers, data base security and integrity, and distributed systems.

**269. Evolution of a Computer Language** (3) I. Walters  
Lecture—3 hours. Prerequisite: course 140A. Review of a specific language: history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta language implementation, validation and performance measures.

**270. Artificial Intelligence** (3) II. The Staff  
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.

**271. Machine Learning and Discovery** (3) III. The Staff  
Lecture—3 hours. Prerequisite: course 170 or the equivalent. 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.

**\*272. Cognitive Modeling** (3) III. The Staff  
Lecture—3 hours. Prerequisite: courses 172 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of current methods in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

**\*274. Automated Deduction** (4) III. Levitt  
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.

**275A. Advanced Computer Graphics** (4) II. Joy, Hamann  
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.

**275B. Advanced Computer Graphics** (4) II. Joy, Hamann  
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.

**277. Advanced Visualization** (4) II. Hamann  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Visualization of 3-D data, including scalar fields, vector fields, and medical data. Primary emphasis on volume visualization.

**\*278. Computer-Aided Geometric Design** (4) III. Joy, Hamann  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Mathematical techniques for the definition and manipulation of curves and surfaces. Coon's patches, Bezier curves and surfaces. B-spline curves and surfaces, beta-splines, box-splines. Integration into various computer graphics rendering models, and computer-aided design systems. Offered in alternate years.

**279. Computer Animation** (4) III. Max, Hamann, Joy  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Control of camera and object motion necessary to produce computer animation, modeling of articulated objects made from jointed segments, and of deformable objects. Students will complete a final animation project.

**289A-L. Special Topics in Computer Science** (1-5) I, II, III. The Staff  
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) Net-



works; **(J)** Computer-Aided Design; **(K)** Scientific Computing; **(L)** Computer Science. May be repeated for credit when topic differs.

**290. Seminar in Computer Science** (1) I, II, III. The Staff

Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.)

**290C. Graduate Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

Lecture, laboratory, or combination. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (S/U grading only.)

**Professional Courses**

**315. Teaching Computer Science** (3) II. Walters  
Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: course 110. Fundamentals of instructional methodology applied to teaching computer science, especially at the introductory level. Behavioral objectives, testing methods, course design, evaluation, technology in instruction.

**390. The Teaching of Computer Science** (1) I, II, III. The Staff

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.)

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Charles E. Hunt, Ph.D., Professor  
Paul J. Hurst, Ph.D., Professor  
H. Brian Kolner, Ph.D., Professor (*Electrical and Computer Engineering and Applied Science*)  
Andre Knoesen, Ph.D., Professor  
Alan J. Laub, Ph.D., Professor (*Computer Science and Electrical and Computer Engineering*)  
Bernard C. Levy, Ph.D., Professor  
Stephen H. Lewis, Ph.D., Associate Professor  
Neville C. Luhmann, Jr., Ph.D., Professor (*Electrical and Computer Engineering and Applied Science*)  
Vojin G. Oklobdzija, Ph.D., Professor  
G.R. Redinbo, Ph.D., Professor  
Todd R. Reed, Ph.D., Associate Professor  
Rosemary Smith, Ph.D., Professor  
Michael A. Soderstrand, Ph.D., Professor  
Olav Solgaard, Ph.D., Assistant Professor  
Richard R. Spencer, Ph.D., Associate Professor  
Shih-Ho Wang, Ph.D., Professor  
Kent D. Wilken, Ph.D., Associate Professor

**Emeriti Faculty**

V. Ralph Algazi, Ph.D., Professor Emeritus  
John N. Churchill, Ph.D., Professor Emeritus  
Richard C. Dorf, Ph.D., Professor Emeritus  
Herman J. Fink, Ph.D., Professor Emeritus  
Mohammed S. Ghausi, Ph.D., Professor Emeritus/Dean Emeritus  
I. Horowitz, Ph.D., Professor Emeritus  
Wen C. Lin, Ph.D., Professor Emeritus  
David Q. Mayne, Ph.D., Professor  
Ronald F. Soohoo, Ph.D., Professor Emeritus  
Jerome J. Suran, Ph.D. (hon.), Senior Lecturer Emeritus

**Affiliated Faculty**

Scott D. Collins, Ph.D., Associate Adjunct Professor  
Sharon N. Farrens, Ph.D., Assistant Adjunct Professor  
M. Guntekin Kabuli, Ph.D., Assistant Adjunct Professor

**Courses in Engineering: Electrical and Computer Engineering (EEC)**

**Lower Division Courses**

**1. Introduction to Electrical and Computer Engineering** (1) III. The Staff (Chairperson in charge)

Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P/NP grading only.)

**70. Computer Structure and Assembly Language** (4) I, III. Redinbo, Soderstrand, Wilken

Lecture—3 hours; workshop—3 hours. Prerequisite: Computer Science Engineering 30 or 35. Restricted during RSVP Pass 1 registration to Electrical Engineering, Computer Engineering and Computer Science and Engineering majors. Introduction to 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 codes; re-entrant code; program development in an operative system.

**73. Applications of Object-Oriented Programming** (4) I, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science Engineering 30. Restricted to the following majors: Electrical Engineering, Computer Engineering, Electrical/Material Science Engineering; and Electrical Engineering graduate students. Non-majors accommodated on a space-available basis. Introduction to the modern programming paradigms of data abstraction and object-oriented programming for engineering applications. Introduction to object-oriented programming in C++/Java language. The technique of modeling an application by defining new

types that match the concepts in the language. Not open for credit to students who have taken course 173.

**89A-U. Special Topics in Electrical and Computer Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)

Lecture, laboratory, or combination. 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)** Opto-Electronics. May be repeated for credit when topic differs.

**90C. Research Group Conference in Electrical and Computer Engineering** (1) I, II, III. The Staff  
Discussion—1 hour. Prerequisite: consent of instructor; lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.)

**90X. Lower Division Seminar** (1-4) I, II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Upper Division Courses**

**100. Circuits II** (5) I, II. The Staff  
Laboratory—3 hours; lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17. Introduction to the theory and application of analog circuits. Students who have completed Engineering 100 may receive only 3.5 units of credit.

**106. Introduction to Image Processing and Computer Vision** (4) I. Reed, Ford, Levy  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Imaging geometry; transforms and sampling; enhancement, restoration, and conversion; image compression; time-varying image analysis; elementary pattern recognition; segmentation; multi-resolution analysis.

**110A. Electronic Circuits I** (4) II, III. Spencer, Lewis, Current, Hurst  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100 and 140A; course 180A (may be taken concurrently). Operation of bipolar and field-effect transistors. 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.

**110B. Electronic Circuits II** (4) I, III. Spencer, Lewis, Current, Hurst  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110A. Frequency response of amplifiers using open-and short-circuit time constraints. Analysis and design of multistage and feedback amplifiers. Stability and compensation of feedback systems. Introduction to oscillators and data converters (analog-to-digital and digital-to-analog converts).

**112. Communication Electronics** (4) II. Lewis  
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 modula-

# Engineering: Electrical and Computer Engineering

(College of Engineering)

Bernard C. Levy, Ph.D., Chairperson of the Department

Gary E. Ford, Ph.D., Vice Chairperson of Undergraduate Studies

Andre Knoesen, Ph.D., Vice Chairperson of Graduate Matters

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**Faculty**

Khaled Abdel-Ghaffar, Ph.D., Associate Professor  
Venkatesh Akella, Ph.D., Assistant Professor  
Smita Bakshi, Ph.D., Assistant Professor  
Robert W. Bower, Ph.D., Professor  
G. R. Branner, Ph.D., Associate Professor  
Tsu-Shuan Chang, Ph.D., Professor  
J. P. Colinge, Ph.D., Professor  
K. Wayne Current, Ph.D., Professor  
Andrew J. Dienes, Ph.D., Professor  
Kamil Feher, Ph.D., Professor  
Gary E. Ford, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Benjamin Friedlander, Ph.D., Professor  
William A. Gardner, Ph.D., Professor  
A. Nazli Gündes, Ph.D., Associate Professor  
S. Louis Hakimi, Ph.D., Professor  
Stephen B. Haley, Ph.D., Professor  
Jonathan P. Heritage, Ph.D., Professor  
T.C. Steve Hsia, Ph.D., Professor

tion (AM) and frequency modulation (FM) are emphasized.

**114. Analog Integrated Circuits (3)** I. Hurst, Spencer, Current, Lewis  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Analysis and design of analog integrated circuits. Emphasis on bipolar transistor circuits. Single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers.

**118. Digital Integrated Circuits (3)** III. Hurst, Current  
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110A, 140B. 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.

**130A. Introductory Electromagnetics I (4)** II, III. Dienes, Heritage, Knoesen  
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B, Physics 9C, Engineering 17. Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plane waves in lossless media. Lossless transmission lines.

**130B. Introductory Electromagnetics II (4)** I, III. Dienes, Heritage, Knoesen  
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.

**131A. Electromagnetic Fields and Waves (3)** I. Dienes, Knoesen  
Lecture—3 hours. Prerequisite: course 130B or the equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides.

**\*131B. Electromagnetic Fields and Waves (3)** II. Dienes  
Lecture—3 hours. Prerequisite: course 131A or the equivalent. Fiber optics. Helix and slow-wave structures. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Traveling wave amplifier.

**\*131C. Electromagnetic Fields and Waves (3)** III. Dienes  
Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavities; microwave networks and components; antennas.

**132A. High-Frequency Systems, Circuits and Devices (4)** I. Branner  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130B. Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

**132B. High-Frequency Systems, Circuits and Devices (5)** II. Branner  
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Passive high frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.

**132C. RF Amplifiers, Oscillators, Mixers and Antennas (5)** III. Branner  
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132B. 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. Analysis and design of linear, loop, waveguide and horn radiators.

**\*135. Optical Communications I: Fibers (3)** III. Dienes, Knoesen  
Lecture—3 hours. Prerequisite: course 130B. Principles of optical communication systems. Dispersion broadening of pulses. Planar dielectric guides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion limitations. Design of zero dispersion fibers.

**140A. Principles of Device Physics I (4)** I, II. Bower, Haley, Hunt, Smith, Colinge  
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17, Physics 9C. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes, p-n junctions, Schottky junctions, and junction field effect transistors.

**140B. Principles of Device Physics II (4)** II, III. Bower, Haley, Hunt, Smith  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electrical properties, design, and models for Bipolar and MOS devices.

**145A. Solid-State Electronics (3)** I. Bower, Haley, Hunt  
Lecture—3 hours. Prerequisite: course 140B. Semiconductor device physics, the principal techniques employed in creating device structures, materials for thin film devices, and heterostructure devices.

**145B. Solid-State Electronics (3)** II. Haley  
Lecture—3 hours. Prerequisite: course 140A. Magnetism and superconductivity. Design of devices and their associated circuits utilizing the magnetic and superconducting properties of solids. Magnetic devices studied include masers and magnetic media: disk, tape and bubbles. Superconducting devices studied include Josephson junctions, SQUIDS, and SC microcircuits.

**146A. Integrated Circuits Fabrication (3)** I. Hunt, Bower, Smith  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students. Non-majors accommodated when space available. 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.

**146B. Advanced Integrated Circuits Fabrication (3)** II. Hunt, Bower, Smith  
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.

**\*148. Superconductivity (3)** III. Haley  
Lecture—3 hours. Prerequisite: courses 130A and 140A. Fundamental properties of superconductors of the first and second kind, London and Ginzburg-Landau theories, Josephson effects, applications and devices.

**150A. Introduction to Signals and Systems I (4)** II, III. Abdel-Ghaffar, Chang, Ford, Levy  
Lecture—4 hours. Prerequisite: 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.

**150B. Introduction to Signals and Systems II (4)** II, III. Hsia, Ford, Friedlander, Wang  
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.

**157A. Control Systems (4)** I, III. Gündes, Wang, Chang, Hsia  
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.

**157B. Control Systems (4)** II. Chang, Gündes, Hsia, Wang  
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.

**160. Signal Analysis and Communications (4)** I. Feher, Ford, Friedlander, Gardner, Levy  
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.

**165. Modulation, Coding, and Noise (3)** II. Gardner, Levy  
Lecture—3 hours. Prerequisite: course 160; Statistics 120. Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog, carrier, and digital pulse modulation. Signal-to-noise ratio, probability of error, matched filters, and Wiener filters. Introduction to information theory and coding.

**166. Digital Communication Design Techniques (4)** I. Feher  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 160. Baseband digital signal processing for digital MODEMS (modulators-demodulators). Digital modulation techniques including BPSK, QPSK, MSK and QAM. Spread spectrum, TDMA and FDMA access methods. Satellite, cellular-mobile, microwave and personal communications systems (PCS) applications. Computer-aided and hardware design projects.

**\*167. Telecommunications Measurements and Instrumentation (3)** II. Feher  
Lecture—3 hours. Prerequisite: course 160. Measurement techniques; instrumentation. Analysis of bit error rate, eye and constellation diagrams; noise and jitter measurement in digital communication and signal processing systems. Spectral and time measurements in digitized PCM voice and video, cellular digital mobile systems. Expert (artificial intelligence) applications. In-class experiments/demonstrations.

**170. Introduction to Computer Architecture (4)** I, III. Oklobdzija, Redinbo, Wilken, Akella  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 180A; course 70 or Computer Science Engineering 50. Introduces 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.

**172. Microcomputer-Based System Design (4)** I, II. Bakshi, Oklobdzija, Akella, Redinbo, Wilken  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A; course 180B recommended. Study of microprocessor architecture and its software conventions. I/O interface design with emphasis on devices such as transceivers, A-D/D-A converters and timers. Peripheral polling and interrupt-driven system design are studied and contrasted. Programming in both assembly and high-level languages.

**174. Microprocessor-Based Instrumentation Systems (4)** III. Soderstrand  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A or Engineering 100. Typical uses of microprocessors and microprocessor development systems in instrumentation applications. Analytical and design methods common to modern instrumentation systems, including: transducers, dynamic response, signal conditioning, A/D conversion, data transmission, hardware interfacing, software development, noise and safety.

**180A. Digital Systems I** (5) I, II, III. Oklobdzija, Redinbo, Wilken, Akella, Hakimi  
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 70 or Computer Science Engineering 50; course 100 or Engineering 100. Restricted to Electrical Engineering, Computer Engineering, Computer Science and Engineering, Computer Science, and Electrical Engineering/Materials Science majors and Electrical Engineering graduate students. Non-majors accommodated when space available. 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.

**180B. Digital Systems II** (5) I, III. Oklobdzija, Redinbo, Wilken, Akella  
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 110A and 180A. Restricted to Electrical Engineering, Computer Engineering, Computer Science and Engineering, Electrical Engineering/Materials Science and Engineering majors, Electrical Engineering graduates, and Computer Science. Non-majors accommodated when space available. Computer-aided digital system design, FPGA-based design, programmable logic, clocking schemes, memory systems, arithmetic, optimizing combinational and sequential digital logic. Not open for credit to students who have taken course 177.

**189A-U. Special Topics in Electrical Engineering and Computer Science** (1-5) I, II, III. The Staff (Chairperson in charge)  
Lecture, laboratory, or combination. 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) Opto-Electronics. May be repeated for credit when topic differs.

**190C. Research Group Conferences in Electrical and Computer Engineering** (1) I, II, III. The Staff  
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.)

**192. Internship in Electrical and Computer Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)  
Internship—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only.)

**194A-194B-194C. Micromouse Design Project** (2-2-1) I-II-III. Soderstrand  
Workshop—3 hours (194A and 194B only); 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). Enrollment in course 194A automatically enrolls student in 194B and 194C. Design of a robotic mouse for the IEEE Micromouse competition. Limited enrollment. May be repeated for credit. (Deferred grading only, pending completion of three-course sequence.)

**195A-195B-195C. Student Design Project** (2-2-1) I-II-III. The Staff  
Laboratory and discussion. Prerequisite: consent of instructor. Enrollment in course 195A automatically enrolls student in 195B and 195C. Design projects and/or contests sponsored by industry. Topics vary; check with department for availability. Course offering subject to student demand/availability of resources. May be repeated for credit. Limited enrollment. (Deferred grading only, pending completion of sequence.)

**197T. Tutoring in Electrical and Computer Engineering** (2-3) I, II, III. The Staff  
Discussion—1 hour; laboratory—3-6 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in electrical and computer engineering courses, especially introductory circuits. For upper division undergraduates who will provide tutoring assistance. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

**201. Digital Processing of Signals** (4) II. Friedlander, Ford  
Lecture—4 hours. Prerequisite: course 150B. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform, and Hilbert transforms.

**206. Digital Image Processing** (4) II. Levy, Reed  
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.

**207. Pattern Recognition and Classification** (3) III. Ford, Reed  
Lecture—3 hours. Prerequisite: Statistics 120. Topics in statistical pattern recognition and classification: linear decision functions and minimum distance classification, Bayes decision theory, clustering algorithms, the generalized perceptron, multi-layer neural networks, and feature extraction.

**\*208. Image Analysis and Computer Vision** (3) III. Levy, Reed  
Lecture—3 hours. Prerequisite: course 150B. Geometry of two-dimensional objects. Edge detection and image segmentation. Image formation and fundamental principles of computer vision. Recovery of three-dimensional structure from shading or stereo information. Analysis of motion and estimation of motion parameters. Geometry and representation of three-dimensional objects. Offered in alternate years.

**209. Image Sequence Processing** (3) III. Reed  
Lecture—3 hours. Prerequisite: course 106. Basic video concepts and image sequences as spatio-temporal data; three-dimensional linear systems; perception of visual motion; enhancement of image sequences; image sequence representation; resolution issues; the computation of motion; image sequence compression. Offered in alternate years.

**210. MOS Analog Circuit Design** (3) I. Lewis, Current, Hurst, Spencer  
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.

**211. Advanced Analog Circuit Design** (3) II. Spencer, Current, Hurst  
Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent recommended. Noise in electronic circuits and systems. Distortion analysis; the translinear principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.

**212. Analog MOS IC Design for Signal Processing** (3) II. Hurst, Lewis  
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.

**213. Data-Conversion Techniques and Circuits** (3) III. Lewis, Current, Hurst, Spencer  
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.

**214. Computer-Aided Circuit Analysis and Design** (3) II. Current  
Lecture—3 hours. Prerequisites: course 110B, 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.

**218A. Introduction to VLSI Circuits** (3) I. Current, Hurst, Oklobdzija, Spencer  
Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design example.

**218B. Multiproject Chip Design** (1) II. Current, Hurst, Oklobdzija, Spencer  
Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiproject chip layouts of projects begun in courses 218A, 212, and 219 are assembled and submitted to the DARPA/NSF MOSIS program for fabrication.

**218C. IC Testing and Evaluation** (1) III. Current, Hurst, Oklobdzija, Spencer  
Laboratory—3 hours. Prerequisite: courses 218A and 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testability are discussed.

**219. Advanced Digital Circuit Design** (3) III. Hurst, Current, Spencer  
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.

**221. Analog Filter Design** (3) I. Soderstrand  
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.

**228. Advanced Microwave and Antenna Design Techniques** (4) III. Branner  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B or 131B. Theory, design, fabrication, analysis of advanced microwave devices, antennas. Includes wideband transformers, tapered networks, stripline and microstripline broadband couplers and hybrids. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. FET amplifiers. Antenna design, analysis of horns, microstrip, log periodic arrays, spirals, and reflectors. Offered in alternate years.

**230. Electromagnetics** (3) I. Dienes  
Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, waveguides, waves in anisotropic media, propagation in dispersive media, laser beams and resonators.

**232A. Advanced Applied Electromagnetics I** (3) II. Branner  
Lecture—3 hours. Prerequisite: course 131B or 132B. The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years.

**232B. Advanced Applied Electromagnetics II** (4) III. Branner  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 131B or 132B. Advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Offered in alternate years.



**235. Photonics** (3) II. Knoesen, Dienes, Heritage, Solgaard

Lecture—3 hours. Prerequisite: course 230. Introduction to optoelectronics. Wave optics, propagation in dispersive and inhomogeneous media. Gaussian beam optics and resonators. Coupled mode theory and coupling devices for dielectric waveguides and optical fibers. Numerical methods. Not open for credit to students who have taken course 231. Offered in alternate years.

**\*236. Nonlinear Optical Applications** (3) I.

Knoesen, Dienes, Heritage, Solgaard  
Lecture—3 hours. Prerequisite: course 130B; course 230 recommended. Nonlinear optical interactions have important applications in optical information processing, telecommunications and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have taken course 233. Offered in alternate years.

**237A. Lasers** (3) I. Dienes, Heritage, Solgaard

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 systems (Not open for credit to students who have completed course 226A.) Offered in alternate years.

**\*237B. Advanced Lasers** (3) II. Dienes, Heritage, Solgaard

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 taken course 226B. Offered in alternate years.

**238. Semiconductor Diode Lasers** (3) III.

Dienes, Heritage, Solgaard  
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.

**240. Semiconductor Devices Physics** (3) I.

Bower, Colinge, Haley, Hunt, Smith  
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.

**241. Advanced Silicon Devices** (3) II. Bower, Colinge, Hunt, Smith

Lecture—3 hours. Prerequisite: course 140B; course 240 recommended. Use of modern electron device design to enhance performance of basic device architectures to satisfy specific requirements in circuits. High-performance field-effect, and bipolar transistors, high-frequency devices, solid-state power devices and field-emission triodes are considered. Offered in alternate years.

**242. Heterojunction Semiconductor Devices** (3) II. Bower, Colinge, Hunt, Smith

Lecture—3 hours. Prerequisite: course 140B; course 240 recommended. Use of materials engineering and device design/fabrication techniques to emphasize particular performance issues in electron devices. Particular emphasis on compound semiconductors and column-IV elemental alloy heterostructures and their applications in quantum, microwave, and photonic devices. Offered in alternate years.

**243. Advanced Electron Devices** (3) III. Bower, Colinge, Hunt, Smith

Lecture—3 hours. Prerequisite: course 140B; course 240 recommended. A detailed examination of novel device types being investigated in current electron device research. Students determine investigation of a specific device type as a term project. Offered in

alternate years. (Not open to students who have taken course 247.)

**244A. Design of Microelectromechanical Systems (MEMS)** (3) I. Solgaard

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.

**244B. Design of Microelectromechanical Systems (MEMS)** (1) III. Solgaard

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.

**245A. Applied Solid-State Physics** (3) II. Haley, Hunt

Lecture—3 hours. Prerequisite: course 140A, Physics 115A. Physics of solids relevant to solid-state applications. Topics include atomic structure of solids, quantum theory of electronic and vibrational states in crystals, electron dynamics, and transport theory.

**245B. Applied Solid-State Physics** (3) III. Haley

Lecture—3 hours. Prerequisite: course 245A. Theory and application of semiconductor heterostructures (SH), magnetism and superconductivity (SC). Topics include quantum wells, wires, and dots; quantum transport in electric and magnetic fields; paramagnetism, ferromagnetism, magnetic resonance; basic superconducting phenomena, Josephson junctions, SQUIDS, and SC microcircuits. Offered in alternate years.

**246. Advanced Projects in IC Fabrication** (3) III. Hunt, Spencer, Smith

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits.

**247. Advanced Semiconductor Devices** (3) I.

Bower, Hunt  
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.

**\*248. Microsensor Design and Fabrication** (3) III. Smith, Bower

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensor systems, including packaging. Offered in alternate years.

**249. Microfabrication** (3) III. Hunt

Lecture—3 hours. Prerequisite: graduate standing in Engineering. 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.

**250. Linear Systems and Signals** (4) I. Wang, Chang, Levy, Gundes

Lecture—4 hours. Prerequisite: course 150A. Review of linear algebra. Mathematical description of systems. Solution of the state equations and an analysis of controllability, observability, realizations, state feedback and state estimation. Introduction to discrete-time signals and system, and the Z-transform.

**\*251. Nonlinear Systems** (3) II. Gundes

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.

**252. Multivariable Control System Design** (3) III. Wang

Lecture—3 hours. Prerequisite: course 250. Review of single-loop feedback design. Stability, performance

and robustness of multivariable control systems. LQG design. H design. Frequency response methods. Optimization-based design.

**253. Adaptive Systems** (3) I. Hsia

Lecture—3 hours. Prerequisite: course 150B; course 250 (may be taken concurrently.) Theory and practice of adaptive systems. Concepts of learning and adaptation. Structure of adaptive filters and the related parameter adaptive algorithms. Applications to system identification, adaptive signal processing and adaptive control.

**254. Optimization** (3) II. Chang

Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C; Mathematics 22A. 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.

**255. Robotic Systems** (3) I. Hsia, Wang

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.

**\*256. Multivariable Feedback Systems** (3) III. Gundes

Lecture—3 hours. Prerequisite: course 250. Analysis and synthesis of feedback control systems using a factorization approach. Q-parametrization, all stabilizing controllers, all achievable input-output maps. Robustness, asymptotic tracking and disturbance rejection. Offered alternate years.

**257. Topics in Optimization** (3) III. Chang

Lecture—3 hours. Prerequisite: graduate standing. Advanced topics in the theoretical foundations of optimization and its applications, such as semi-infinite and nondifferentiable optimization in engineering design, optimal control, stochastic programming/optimal control, global optimization, convex analysis and optimization, linear and integer programming, VLSI physical design automation. May be repeated for credit when topic differs.

**259. Fuzzy Systems and Control** (3) I. Wang

Lecture—3 hours. Prerequisite: course 157A. Fuzzy sets and relations, fuzzy logic and approximate reasoning. Fuzzy systems and properties. Design of fuzzy systems from input/output data. Fuzzy control systems. Fuzzy logic and soft computing. Offered in alternate years.

**260. Random Signals and Noise** (4) II. Gardner

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.

**262. Spectral Analysis** (4) III. Gardner

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A; course 150B recommended. Theory and methodology of empirical spectral analysis of random signals. Fundamentals of resolution, leakage, and reliability. Analog and digital methods. Parametric modeling and non-parametric methods. Cross-spectral analysis. Applications to detection and estimation. Offered in alternate years.

**263. Optimal and Adaptive Filtering** (3) III.

Friedlander, Gardner, Levy  
Lecture—3 hours. Prerequisite: course 260. Geometric foundation for mean-square estimation problems. Theory and applications of optimum Wiener filtering, optimum Kalman filtering, and adaptive estimation. Offered in alternate years.

**264. Estimation and Detection of Signals in Noise** (4) I. Friedlander, Gardner, Levy

Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detection 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.

**265. Principles of Digital Communications (4) I.** Abdel-Ghaffar, Friedlander, Gardner, Levy  
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.

**266. Information Theory and Coding (3) II.** Abdel-Ghaffar  
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.

**267. Cellular Digital Mobile Communications (3) I.** Feher  
Lecture—3 hours. Prerequisite: courses 150A, 160, and Statistics 120 (or the equivalent). Wireless cellular, digital mobile and personal communication systems (PCS). Radio propagation, digital modulation and error control. Access methods: spread spectrum, FDMA and TDMA. Antenna diversity. Computer-aided system and hardware design.

**\*268. Digital Modulation Techniques (3) III.** Feher  
Lecture—3 hours. Prerequisite: course 267. MODEM (modulator–demodulator) signal processing and complete radio transmitter/receiver analysis, design and application for digital cellular mobile radio satellite, microwave, and cable systems. Study of advanced  $\frac{1}{4}$ -QPSK, GMSK, coded QAM and of correlated/coded modems. Computer-aided and hardware design of advanced communications and synchronization systems. Offered in alternate years.

**\*269. Error Correcting Codes (3) II.** Abdel-Ghaffar  
Lecture—3 hours. Prerequisite: Mathematics 22A. Introduction to coding theory, finite fields, linear codes, Hamming codes, cyclic codes, BCH and RS codes and their decoding algorithms, convolutional codes.

**270. Computer Architecture (3) II.** Akella, Redinbo, Oklobdzija, Wilken  
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.

**\*274. Parallel Computer Architectures (3) II.** Oklobdzija, Redinbo  
Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining. Multiple-CPU parallelism, through array processors and multiprocessors, and through novel structures such as dataflow machines. Current research.

**275. Advanced Object-Oriented Programming (3) II.** Wang  
Lecture—3 hours. Prerequisite: course 173. Object-oriented analysis, design and implementation of complex software systems. Topics include fundamental concepts of object models, the notation and process of object-oriented analysis and design, creating graphical user interface, application of object-oriented development across different application domains.

**276. Fault-Tolerant Computer Systems: Design and Analysis (3) II.** Redinbo, Wilken  
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 taken course 276A. Offered in alternate years.

**\*278. Computer Arithmetic for Digital Implementation (3) III.** Oklobdzija, Redinbo  
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.

**\*280. Advanced Logic Design (3) I.** Oklobdzija  
Lecture—3 hours. Prerequisite: course 180B. Logic design of complex and high-performance systems. Timing, clock generation and distribution. High performance latch design. Pipelining, pipeline conflicts and hazard resolution. Complex control unit design. Use of FPGAs. Design methodology and CAD tools.

**282. Digital Systems Modeling and Design (3) III.** Akella  
Lecture—3 hours. Prerequisite: courses 180B, Computer Science Engineering 122 and 142, or the equivalents, or consent of instructor. Modeling of digital systems using hardware description languages such as VHDL or Verilog. Introduction to application-specific integrated circuit (ASIC) design using commercial synthesis and simulation tools.

**286. Introduction to Digital System Testing (3) III.** Redinbo  
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 taken course 276A. Offered in alternate years.

**289A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III.** The Staff (Chairperson in charge)  
Lecture, laboratory, or combination. 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) Opto-Electronics. May be repeated for credit when topic differs.

**290. Seminar in Electrical and Computer Engineering (1) I.** The Staff  
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.)

**290C. Graduate Research Group Conference in Electrical and Computer Engineering (1) I, II, III.** The Staff  
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.)

**291. Solid-State Circuit Research Laboratory Seminar (1) III.** The Staff (Spencer in charge)  
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.)

**292. Seminar in Solid-State Technology (1) III.** The Staff  
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.)

**293. Computer Engineering Research Seminar (1) II, III.** The Staff  
Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Lectures, tutorials, and seminars on topics in computer engineering. May be repeated for credit. (S/U grading only.)

**294. Image, Video, and Computer Vision Research Seminar (1) II, III.**  
Seminar—1 hour. Prerequisite: graduate standing. Lectures, tutorials, and seminars on image processing, video engineering, and computer vision. May be repeated for credit. (S/U grading only.)

**295. Systems, Control and Robotics Seminar (1) II.** Hsia, Gündes, Chang, Wang  
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.)

**296. Photonics Research Seminar (1) II, III.** Dienes, Heritage, Knoesen, Solgaard  
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.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)  
(S/U grading only.)

### Professional Course

**390. The Teaching of Electrical Engineering (1) I, II, III.** The Staff  
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.)

**396. Teaching Assistant Training Practicum (1-4) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Engineering: Mechanical and Aeronautical

(College of Engineering)

Bahram Ravani, Ph.D., Chairperson of the Department

Ian M. Kennedy, Ph.D., Vice Chairperson of the Department

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Harry H. Cheng, Ph.D., Associate Professor

Harry A. Dwyer, Ph.D., Professor (*Aeronautical Science and Engineering*)

Fidelis O. Eke, Ph.D., Associate Professor

Andrew A. Frank, Ph.D., Professor

Mohamed M. Hafez, Ph.D., Professor (*Aeronautical Science and Engineering*), *Academic Senate Distinguished Teaching Award*

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 Ian M. Kennedy, Ph.D., Professor  
 Wolfgang Kollmann, Dr.-ing, Professor (*Aeronautical Science and Engineering*)  
 Donald L. Margolis, Ph.D., Professor  
 Bahram Ravani, Ph.D., Professor  
 Lawrence W. Rehfield, Ph.D. Professor (*Aeronautical Science and Engineering*)  
 Nesrin Sarigul-Klijn, Ph.D., Professor (*Aeronautical Science and Engineering*)  
 Benjamin D. Shaw, Ph.D., Associate Professor  
 S. Antony Snell, Ph.D., Assistant Professor (*Aeronautical Science and Engineering*)  
 Cornelis P. van Dam, Ph.D., Professor (*Aeronautical Science and Engineering*)  
 Steven A. Velinsky, Ph.D., Professor  
 Bruce R. White, Ph.D., Professor (*Aeronautical Science and Engineering*)  
 Kazuo Yamazaki, Ph.D., Professor

**Emeriti Faculty**

Charles W. Beadle, Ph.D., Professor Emeritus  
 Harry Brandt, Ph.D., Professor Emeritus  
 John W. Brewer, Ph.D., Professor Emeritus  
 Clyne F. Garland, M.S., Professor Emeritus  
 Warren H. Giedt, Ph.D., Professor Emeritus  
 Jerald M. Henderson, D.Eng., Professor Emeritus  
 Myron A. Hoffman, Sc.D., Professor Emeritus  
 John D. Kemper, Ph.D., Professor Emeritus  
 Allan A. McKillop, Ph.D., Professor Emeritus  
 An Tzu Yang, D.E.Sc., Professor Emeritus

**Affiliated Faculty**

Billy Sanders, Ph.D., Lecturer  
 James Schaaf, Ph.D., Lecturer

**Division of Aeronautical Science and Engineering**

**Faculty**

Jean-Jacques Chattot, Ph.D., Professor  
 Harry A. Dwyer, Ph.D., Professor (*Mechanical Engineering*)  
 Mohamed M. Hafez, Ph.D., Professor  
 Ronald A. Hess, Ph.D., Professor (*Mechanical Engineering*)  
 Wolfgang Kollmann, Dr.-ing, Professor (*Mechanical Engineering*)  
 Lawrence W. Rehfield, Ph.D. Professor  
 Nesrin Sarigul-Klijn, Ph.D., Professor  
 S. Antony Snell, Ph.D., Assistant Professor (*Mechanical Engineering*)  
 Cornelis P. van Dam, Ph.D., Professor  
 Bruce R. White, Ph.D. Professor (*Mechanical Engineering*)

**Courses in Engineering: Mechanical (EME)**

*(Courses in Mechanical Engineering (EME) are listed below; courses in Aeronautical Science and Engineering (EAE) are listed immediately following.)*

**Lower Division Courses**

**1. Mechanical Engineering (1)** I. The Staff (Chairperson in charge)  
 Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics and responsibilities. (P/NP grading only.)  
**50. Manufacturing Processes (3)** I, II, III. Schaaf  
 Discussion—2 hours; laboratory—3 hours. Prerequisite: Engineering 4, consent of instructor. Restricted to Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to and experience with modern manufacturing methods, manufacturing instructions and computer-aided manufacturing and their role in the engineering design and development process.

**92. Internship in Mechanical Engineering (1-5)** I, II, III. The Staff (Chairperson in charge)  
 Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in engineering. May be repeated for credit. (P/NP grading only.)  
**99. Special Study for Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

**Upper Division Courses**

**134. Vehicle Stability (4)** III. Hubbard  
 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.

**150A. Mechanical Design (4)** I, III. Hull, Hill, Schaaf  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45 and 104, course 50 (may be taken concurrently). Principles of engineering mechanics applied to the fundamentals of mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware.

**150B. Mechanical Design (4)** I, II. Hill, Schaaf  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Principles of engineering mechanics, failure theories and fatigue theory applied to the design and selection of mechanical components. Design projects which concentrate on design, engineering analysis, methods of manufacture, material selection and cost. Introduction to computer-aided design.

**151. Statistical Methods in Design and Manufacturing (3)** II. Hull  
 Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing quality control. Applications include product evaluation and decision making, probabilistic design, methods of sampling inspections and control charts.

**152. Computer-Aided Mechanism Design (3)** I. Cheng  
 Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5 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.

**153. Introduction to Machining of Material (3)** III. Yamazaki  
 Lecture—3 hours. Prerequisite: Engineering 36, 45, 104, and course 50. Material removal characteristics, kinematics and dynamics of material removal processes such as metal cutting, grinding, non-traditional machining such as EDM and laser cutting, and quality in machining. The lecture is accompanied by live demonstrations of the technology.

**154. Introduction to Mechatronics (3)** II. Yamazaki  
 Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102; Engineering 100 or Electrical and Computer Engineering 100; course 50 or consent of instructor. Mechatronics system concept, academic subjects related to mechatronics, mechatronics system overview, control system design overview, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator control technology, power electronics for actuator drives.

**161. Combustion and the Environment (4)** III. Kennedy  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Introduction to combustion kinetics; the theory of premixed flames and diffu-

sion 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.

**162. Modern Power Systems (4)** II. Hoffman  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

**163. Internal Combustion Engines (3)** I. Dwyer  
 Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A; Engineering 103B and 105B recommended. Fundamentals of internal combustion engine design and performance, and the need to adapt the IC engine to increased environmental concerns. Emphasis on thermal processes in the engine, but other subsystems will be discussed.

**165. Fundamentals of Heat Transfer (4)** I, II, III. Aldredge, Baughn, Dwyer  
 Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors and Biological Systems and Food Engineering majors. Fundamentals of conduction, convection and radiation heat transfer; applications to engineering equipment with use of digital computers.

**171. Analysis, Simulation and Design of Dynamic Systems (4)** I, II. Karnopp, Margolis  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102. Modeling of dynamic engineering systems in various energy domains. Analysis of response of linear system models. Digital computer simulation.

**172. Automatic Control of Engineering Systems (4)** II, III. Eke, Hess  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

**176. Measurement Systems (3)** II, III. Frank, Cheng  
 Lecture—2 hours; discussion—0.5 hours; laboratory—1.5 hours. Prerequisite: Engineering 100 and course 171. Theory of measurements; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitalization.

**184A. Senior Design Project (2)** I, II, III. The Staff  
 Laboratory—6 hours. Prerequisite: course 150B, 165, 172 or Aeronautical Engineering 25 (may be taken concurrently); senior standing in Mechanical Engineering, consent of instructor. Performance of practical mechanical engineering projects which include one or more of the following: analysis, design, development and evaluation of mechanical engineering system. (Deferred grading only, pending completion of sequence.)

**184B. Senior Design Project (2)** I, II, III. The Staff  
 Laboratory—6 hours. Prerequisite: course 184A in a previous quarter from the same instructor; consent of instructor. Performance of practical mechanical engineering projects which include one or more of the following: analysis, design, development, and evaluation of a mechanical engineering system.

**185A. Mechanical Systems Design Project (2)** II. Velinsky  
 Lecture—1 hour; laboratory—3 hours. Prerequisite: course 150B (may be taken concurrently); senior standing in Mechanical 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.)

**185B. Mechanical Systems Design Project (2)** III. Velinsky  
 Lecture—1 hour; laboratory—3 hours. Prerequisite: course 185A; senior standing in Mechanical Engineering (enrollment preference to students who have

\*Course not offered this academic year.

not taken course 186 or 187). Capstone mechanical engineering design course; the mechanical engineering design process and its use in the design of engineering systems.

**186. Thermal Systems Design Project (4) III.** Baughn

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165; senior standing in Mechanical Engineering or Physics (enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, including consideration of engineering and economic factors. Grading based on individual contributions to project. Limited enrollment.

**187. Control Systems Design Project (4) I.** Hubbard

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 172, consent of instructor, senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of plant, consideration of passive, open loop, and closed loop active solutions. Hardware and cost/performance considerations. Grading based on individual contributions to projects.

**188. Vehicle Systems Design Project (4) II.** Hubbard

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of vehicle systems, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

**189A-B. Selected Topics in Mechanical Engineering (1) II, III.**

Lecture/discussion—1 hour biweekly; laboratory—3 hours biweekly. Prerequisite: consent of instructor. Directed group study of selected topics with separate sections in (A) Fluid Mechanics Laboratory; (B) Thermodynamics Laboratory.

**192. Internship in Engineering (1-5) I, II, III.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**\*205. Thermal Radiation (3) II.** Baughn

Lecture—3 hours. Prerequisite: course 165 or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems. Offered in alternate years.

**207. Mechanical Engineering Experimentation and Uncertainty Analysis (3) II.** Baughn

Lecture—3 hours. Prerequisite: course 176. Design and analysis of mechanical engineering experiments with an emphasis on general and detailed uncertainty analysis, propagation of bias and precision errors, jitter programs and data analysis.

**208. Experimental Methods in Fluid Mechanics and Combustion (3) III.** Kennedy

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 165 and Engineering 103B. Application of shadow, schlieren and other flow visualization methods. Introduction to optics and lasers. Measurement of velocity and concentrations in reacting and non-reacting flows with laser diagnostic techniques

including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered in alternate years. Not open for credit to students who have taken course 208B.

**210A. Advanced Fluid Mechanics and Heat Transfer (4) I.** White

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, course 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.

**210B. Advanced Fluid Mechanics and Heat Transfer (4) II.** Kollmann

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.

**\*211. Fluid Flow and Heat Transfer Design (4) I.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A (may be taken concurrently) or consent of instructor. Design aspects of selected topics such as heat conduction, thermal stresses, fins; heat transport in ducts, boundary layers and separated flows; impingement and film cooling; heat exchangers; flow in diffusers, flow over airfoils and blades. Offered in alternate years.

**\*213. Advanced Turbulence Modeling (4) III.** Aldredge

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.

**214. Numerical Calculation of Flows with Heat Transfer, Mass Transfer, and Chemical Reactions (4) III.** Dwyer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A and Aeronautical Science Engineering 233, or consent of instructor. Application of numerical approximation methods of fluid flows involving heat and mass transfer for mechanical and aeronautical applications. Applications to pipe flows; high Peclet number heat transfer; laminar and turbulent combustion; and solution of the Navier-Stokes equations. Offered in alternate years.

**215. Biomedical Fluid Mechanics and Transport Phenomena (4) I.** Barakat

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B 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.)

**\*216. Advanced Thermodynamics (4) III.** Kollmann

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105B. 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. Offered in alternate years.

**217. Combustion (4) II.** Shaw

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. 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.

**218. Advanced Energy Systems (4) I.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, 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, magneto-hydrodynamic, or solar electric powerplant. Offered in alternate years.

**220A-220B. Mechanical Vibrations (3-3) II-III.** Margolis

Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

**222. Advanced Dynamics (3) I.** Karnopp

Lecture—3 hours. Prerequisite: Engineering 102. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

**223A. Multibody Dynamics I (3) II.** Hubbard

Lecture—3 hours. Prerequisite: Engineering 102 or the equivalent; graduate standing. Dynamics of coupled rigid bodies. Reference frames. Differentiation of vector functions. Multibody kinematics; configuration and motion constraints; holonomicity; nonholonomicity; generalized speeds; partial velocities. Mass and inertia properties; inertia tensor, inertia theorems. Angular momentum; angular momentum theorems. Force systems; generalized forces. (Same course as Biomedical Engineering 223A.)

**223B. Multibody Dynamics II (3) III.** Hubbard

Lecture—3 hours. Prerequisite: course 223A. Kinematics and dynamics of coupled rigid bodies. Comparison of various methods for obtaining rigid multibody dynamical equations. Newton/Euler formalism. Energy functions; Lagrange's Equations; Kane's method. Computer-aided dynamics of multibody systems. Rigid body orientation; Euler angles; Euler parameters; Rodrigues parameters. (Same course as Biomedical Engineering 223B.)

**\*224. Kinematic Design of Mechanisms (3) II.** Cheng

Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Bernemster theory of the rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curvature analysis, circle- and center-point curves. Graphic and computer methods for kinematic design. Offered in alternate years.

**225. Spatial Kinematics and Robotics (3) II.** Cheng

Lecture—3 hours. Prerequisite: course 222. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years. (Same course as Biomedical Engineering 225.)

**\*226. Acoustics and Noise Control (3) I.** Margolis

Lecture—3 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 of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in alternate years.

**227. Research Techniques in Biomechanics (4) II.** Williams, Hawkins

Lecture—2 hours; laboratory—4 hours; term paper or discussion—1 hour. Prerequisite: consent of instructor; 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 Biomedical Engineering 227/Exercise Science 227.)



**\*231. Musculo-Skeletal System Biomechanics**

(3) III. Hull  
Lecture—3 hours. Prerequisite: course 176 and 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. Offered in alternate years. (Same course as Biomedical Engineering 231.)

**\*232. Skeletal Tissue Mechanics** (3) III. Martin  
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 anatomical 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.)

**234. Design and Dynamics of Road Vehicles** (3)

I. Velinsky  
Lecture—3 hours. Prerequisite: course 134. Analysis and numerical simulation of road vehicles with emphasis on design applications. Offered in alternate years.

**250A. Advanced Methods in Mechanical Design** (3) II. Ravani

Lecture—3 hours. Prerequisite: courses 150A and 150B or the equivalents; Engineering 182 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.

**250B. Advanced Methods in Mechanical Design** (3) III. Velinsky

Lecture—3 hours. Prerequisite: course 250A. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in variational methods of mechanics with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools.

**251. Mechatronics** (4) III. The Staff

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 50, 154, 172 and Engineering 100. Studies of techniques required for designing the electro-mechanical system which consists of the mechanism and the electronics-based sophisticated control. Methodologies for designing the microprocessor applied control hardware and dedicated software and applying electric actuator and sensors with its theoretical background.

**254. Engineering Software Design** (3) I. Cheng

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 180 or Applied Science Engineering 115. Principle and design of engineering software in C and its extensions, advanced topics in engineering software design, including real-time computing and sensor fusion, shell programming, symbolic computing, and multimedia.

**255. Computer-Aided Design and Manufacturing** (3) III. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 180 and course 150B. Proficiency in a high-level programming language such as FORTRAN, Pascal, or C. Studies of computational and computer graphic techniques in design and manufacturing. Use of numeric and non-numeric computations and geometric tools in design and manufacturing. Offered in alternate years.

**271. Modeling and Simulation of Engineering Systems** (3) I. Karnopp

Lecture—3 hours. Prerequisite: course 171. Multiport models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; modeling of multiple energy domain systems; 3-dimensional mechanics; formulation for digital simulation; identification; instrumentation; approximate models of distributed systems.

**272. Theory and Design of SISO Control Systems** (3) I. Snell

Lecture—3 hours. Prerequisite: course 172. Mathematical representations of linear dynamical systems. Benefits and costs of feedback for single input, single output (SISO) systems. Analysis and design of control systems based on classical and modern approaches with emphasis on applications to mechanical and aeronautical systems.

**273. Theory and Design of MIMO Control Systems** (3) II. Snell

Lecture—3 hours. Prerequisite: course 272. Mathematical representations of linear dynamical systems. Benefits and costs of feedback for multiple input, multiple output (MIMO) systems. Analysis of state-space, loop-shaping, and classical control design strategies with emphasis on applications to mechanical and aeronautical systems.

**274. Analysis and Design of Digital Control Systems** (3) III. Hess

Lecture—3 hours. Prerequisite: course 172. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects.

**\*276A. Digital Data Acquisition and Analysis**

(3) I. The Staff  
Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and mini-computers to data acquisition and control. Topics include computer organization, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, and basic data analysis.

**276B. Digital Data Acquisition and Analysis** (3)

III. Frank  
Lecture—3 hours. Prerequisite: basic course in probability and statistics, Engineering 180 or the equivalent, and either course 176 or 172. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characterization of linear dynamic systems. Offered in alternate years.

**\*277. Computer-Aided Design of Nonlinear Dynamic Systems** (3) III. Margolis

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph processor programs ENPORT and CAMP are used with advanced continuous system modeling programs to simulate the dynamic response of engineering systems. Offered in alternate years.

**278. Theory and Design of Nonlinear Control Systems** (3) III. Karnopp

Lecture—3 hours. Prerequisite: course 172. Mathematical modeling of nonlinear dynamical systems. Stability analysis and Lyapunov theory. Design approaches, describing functions, feedback linearization, dynamic inversion, sliding mode control, robust control. Applications to mechanical and aeronautical systems.

**280. Advanced Engineering Analysis** (3) II.

Aldredge  
Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

**290C. Graduate Research Conference** (1) I, II,

III. The Staff (Chairperson in charge)  
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

**295. Dynamic Systems, Controls, Design Seminar** (1) I, II, III. The Staff

Seminar—1 hour. Current developments in the mechanical systems design and analysis area includ-

ing dynamic systems, controls, and design with presentations by students, faculty and visitors. May be repeated for credit. (S/U grading only.)

**296. Fluid and Thermal Sciences** (1) I, II, III.

The Staff  
Seminar—1 hour. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff

(Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course**

**390. The Teaching of Mechanical Engineering**

(1) I, II, III. The Staff (Chairperson in charge)  
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical 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.)

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Courses in Aeronautical Science and Engineering (EAE)**

**Lower Division Course**

**25. Aeronautical Engineering Fundamentals** (3)

II. Sarigou-Klijn  
Lecture—3 hours. Prerequisite: Mathematics 21A. Restricted to Mechanical and Aeronautical Science and Engineering majors. History of aeronautics. Aircraft subsystems and nomenclature. Fundamentals of aircraft aerodynamics, performance, stability and control, structures and aeroelasticity, and propulsion. Not open for credit to students who have completed course 125.

**99. Special Study for Undergraduates** (1-5) I, II,

III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

**Upper Division Courses**

**126. Theoretical and Computational**

**Aerodynamics** (4) III. Hafez  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 25; Engineering 103B; Engineering 180 or 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.

**127. Applied Aircraft Aerodynamics** (4) I.

Chattot  
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.

**128. Aircraft Performance** (4) II. van Dam

Lecture—3 hours; discussion—1 hour. Prerequisite: course 127. Aircraft propulsion systems and their performance characteristics. Methods for computing and presenting aircraft performance data. Modern techniques of numerical analysis and energy methods. Application of techniques to aircraft design.

**129. Aircraft Stability and Control** (4) II. Hess

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102. Aircraft static stability and control. Derivation and linearization of general equations of motion for aircraft. Longitudinal dynamic stability analysis. Introduction to lateral-directional dynamic stability. Stability derivatives. Application of numerical methods to aircraft design.

\*Course not offered this academic year.



**130. Aircraft Preliminary Design** (4) III. van Dam  
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 128 and 129. Aircraft preliminary design including estimation of weight/ volume, aerodynamics, performance, stability and control. Design iteration and trade-off studies.

**\*131. Aircraft Flight Performance Laboratory** (3) III. The Staff

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 25 and 128. Measurements and analysis of aircraft characteristics and performance, in flight and with flight simulator.

**133. Finite Element Methods in Structures** (4) III. Sarigul-Klijn

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.

**135. Aerospace Structures** (3) I. Rehfield  
Lecture—3 hours. Prerequisite: course 133. Analysis and design methods used in aircraft structures. Shear flow in open, closed and multi-cell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.

**137. Structural Composites** (4) II. Rehfield  
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.

**138. Aircraft Propulsion** (4) II. Baughn  
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, and 105B. 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.

**139. Introduction to Aeroelasticity** (4) III. Sarigul-Klijn

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B and 104. Introduction to fluid-structure interaction. Flexible structures. Design of structural components under aeroelastic constraints. Static aeroelasticity. Control effectiveness. Unsteady aerodynamics. Flutter. Aeroelastic tailoring in design.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**232. Advanced Aerodynamics** (3) II. Hafez  
Lecture—3 hours. Prerequisite: course 126. Study of inviscid and viscous flows about aerodynamic shapes at subsonic, transonic and supersonic conditions. Application of aerodynamic theory to design for reduced drag and increased lift.

**233. Introduction to Computational Aerodynamics and Fluid Dynamics** (4) I. Chattot

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. 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.

**\*234. Computational Aerodynamics** (4) II. Lecture—4 hours. Prerequisite: courses 230, 233. 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.

**236. Aerodynamics in Nature and Technology** (3) III. White

Lecture—3 hours. Prerequisite: Engineering 103B. 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.

**\*237. Analysis and Design of Composite Structures** (4) III. Rehfield

Lecture—3 hours; discussion—1 hour. Prerequisite: course 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes. Offered in alternate years.

**238. Advanced Aerodynamic Design and Optimization** (4) III. van Dam

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.

**240. Computational Methods in Nonlinear Mechanics** (4) II. Sarigul-Klijn

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.)

**241. Advanced Aerospace Structures** (3) I. Sarigul-Klijn

Lecture—3 hours. Prerequisite: course 135. Classical methods applied to aerospace structural analysis. Thin-walled members. Thin plate theory. Stresses in multi-cell structures. Stability of thin-walled members. Introduction to thermoelastic effects.

**248. Advanced Turbomachinery** (3) I. The Staff  
Lecture—3 hours. Prerequisite: Engineering 103B, 105B. Preliminary aerodynamic design of axial and radial flow compressors and turbines. Design of diffusers. Selection of turbomachine configurations and approximations to optimum dimensions and flow angles. Introduction to through flow analysis. Rotating stall and surge, and aeromechanical considerations.

**\*261. Gas Dynamics** (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B 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. Steady compressible boundary layer flow. Offered in alternate years.

**275. Advanced Aircraft Stability and Control** (3) III. Snell

Lecture—3 hours. Prerequisite: Mechanical Engineering 172. 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.

**289A-D. Selected Topics in Aeronautical Science and Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (A) Advances in Finite Elements and Optimization; (B) Quantitative Feedback Theory; (C) Human-Machine Integration in Dynamic Systems; (D) Advances in Propulsion Systems. May be repeated for credit.

**290C. Graduate Research Conference** (1) I, II, III. The Staff (Chairperson in charge)  
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course**

**390. The Teaching of Aeronautical Science and Engineering** (1) I, II, III. The Staff  
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.)

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## English

(College of Letters and Science)  
Karl F. Zender, Ph.D., Chairperson of the Department  
Department Office, 176 Voorhies Hall,  
(530-752-2257)

**Faculty**

Don P. Abbott, Ph.D., Professor (*Classics, English*)  
Max Byrd, Ph.D., Professor  
Caron A. Cioffi, Ph.D., Assistant Professor  
Peter A. Dale, Ph.D., Professor  
Joanne F. Diehl, Ph.D., Professor  
Margaret W. Ferguson, Ph.D., Professor  
Sandra M. Gilbert, Ph.D., Professor  
Peter L. Hays, Ph.D., Professor  
W. Jack Hicks, Ph.D., Senior Lecturer  
Michael J. Hoffman, Ph.D., Professor  
Alessa Johns, Ph.D., Assistant Professor  
Richard A. Levin, Ph.D., Associate Professor,  
*Academic Senate Distinguished Teaching Award*  
Kari E. Lokke, Ph.D., Associate Professor  
(*Comparative Literature, English*)  
Clarence Major, Ph.D., Professor  
Sandra J. McPherson, B.A., Professor  
Patricia L. Moran, Ph.D., Associate Professor  
Linda A. Morris, Ph.D., Professor  
Marijane Osborn, Ph.D., Professor  
David A. Robertson, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Catherine M. Robson, Ph.D., Assistant Professor  
Winfried Schleiner, Ph.D., Professor  
David Simpson, Ph.D., Professor  
Gary Snyder, B.A., Professor  
David Van Leer, Ph.D., Professor  
Katherine A. Vaz, M.F.A., Associate Professor  
Raymond B. Waddington, Ph.D., Professor  
Alan B. Williamson, Ph.D., Professor  
W. B. Worthen, Ph.D., Professor (*Dramatic Art, English*)  
Karl F. Zender, Ph.D., Professor

**Emeriti Faculty**

William E. Baker, Ph.D., Professor Emeritus  
Everett Carter, Ph.D., Professor Emeritus  
Thomas A. Hanzo, Ph.D., Professor Emeritus  
Wayne Harsh, Ph.D., Professor Emeritus  
John O. Hayden, Ph.D., Professor Emeritus  
Robert H. Hopkins, Ph.D., Professor Emeritus  
Arthur E. McGuinness, Ph.D., Professor Emeritus  
James J. Murphy, Ph.D., Professor Emeritus

Gwendolyn Schwabe, M.A., Senior Lecturer Emerita  
 Karl J. Shapiro, Professor Emeritus  
 Daniel Silvia, Ph.D., Professor Emeritus  
 Brom Weber, Ph.D., Professor of American Literature Emeritus  
 James L. Woodress, Ph.D., Professor Emeritus  
 Celeste T. Wright, Ph.D., Professor Emerita

**Affiliated Faculty**

Cynthia J. Bates, M.A., Lecturer  
 Linda N. Bates, Ph.D., Lecturer  
 Mary E. Bly, M.A., Lecturer  
 John Boe, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*  
 Marlene B. Clarke, Ph.D., Lecturer  
 Mardena E. Creek-Michelson, Ph.D., Lecturer  
 Elizabeth Davis Ph.D., Lecturer  
 Pamela Demory, Ph.D., Lecturer  
 Margaret Eldred, Ph.D., Lecturer  
 Dale B. Flynn, Ph.D., Lecturer  
 Gary S. Goodman, Ph.D., Lecturer  
 Jared Haynes, M.A., Lecturer  
 Donald B. Johns, Ph.D., Lecturer  
 Pamela J. Major, Ph.D., Lecturer  
 Nancy V. Morrow, Ph.D., Lecturer  
 Susan E. Palo, Ph.D., Lecturer  
 Janet L. Papale, M.A., Lecturer, *Academic Federation Excellence in Teaching Award*  
 Raquel Scherr, Ph.D., Lecturer  
 Eric J. Schroeder, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*  
 John Stenzel, Ph.D., Lecturer  
 Jayne L. Walker, Ph.D., Lecturer

**The Major Program**

The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect.

**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 *teaching* emphasis, a *creative writing* emphasis, or a *general literature* emphasis. The teaching emphasis focuses on the study of composition and of language. The writing emphasis focuses on fiction, poetry, and article writing. Creative writing majors have an opportunity to work with distinguished professional writers of fiction and poetry. The general literature emphasis focuses on a series of related courses in various historical periods of English and American literature.

**Career Alternatives.** Graduates have found the major excellent pre-professional training for graduate study in English, as well as for careers in teaching, 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. Degree Requirements:**

|                                                                                                                                                                                                                                       |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                                                                                                       | UNITS     |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                               | <b>20</b> |
| English 1 or 3 .....                                                                                                                                                                                                                  | 4         |
| English 45 .....                                                                                                                                                                                                                      | 4         |
| English 46A, 46B, 46C .....                                                                                                                                                                                                           | 12        |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                     | <b>44</b> |
| Shakespeare, English 117A, 117B, or 117C....                                                                                                                                                                                          | 4         |
| British literature, two courses in periods prior to 1800: English 111, 113A, 113B, 115, 122, 123, 150A, 155A, or suitable section of 177 .....                                                                                        | 8         |
| American literature, two courses, one pre-Civil War (English 142, 143, 158A, or suitable sections of 177 or 185A), one post-Civil War (English 144, 146, 158B, 181A, 181B, or suitable sections of 152, 177, 178, 179, or 185B) ..... | 8         |

Senior Seminar, one course selected from English 187, 188, 189, 194H.....4

Area of Emphasis (choose one).....20

*General Emphasis*

Five upper division English electives .....

20

*Creative Writing Emphasis*

Three sections of English 100F, 100P and/or 100NF .....

12

Two upper division English electives .....

8

(Students pursuing the Creative Writing Emphasis may replace the senior seminar portion of the core requirement with a third upper division English elective of 4 units.)

*Teaching Emphasis*

English 101 or 104A, 104B, 104C, 104D, or 104E.....4

English 105 or Linguistics 104 .....

4

One course selected from English 178, 179, 181A, 181B, or an upper division ethnic literature course from outside the English department.....4

Two upper division English electives .....

8

**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, M. Byrd, C.A. Cioffi, J.F. Diehl, M. Ferguson, S.M. Gilbert, P.L. Hays, W.J. Hicks, M.J. Hoffman, A. Johns, R.A. Levin, K.E. Lokke, C. Major, S.J. McPherson, P.L. Moran, L.A. Morris, M. Osborn, D.A. Robertson, C.M. Robson, W. Schleiner, D. Simpson, D. Van Leer, K.A. Vaz, R.B. Waddington, A.B. Williamson, W.B. Worthen, K.F. Zender.

**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 their advisers, 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:** P.L. Hays.

**Minor Program Requirements:**

|                                                                                     |              |
|-------------------------------------------------------------------------------------|--------------|
|                                                                                     | UNITS        |
| <b>English</b> .....                                                                | <b>19-20</b> |
| Five upper division courses, at least four of which will be literature courses..... | 19-20        |

**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 honors program consists of four units of 194H and four units of 195H, normally taken during the fall and winter quarters 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 Office, 176 Voorhies Hall. Refer to the Academic Information chapter for Dean's Honors List information.

**Campus Writing Center.** The Campus Writing Center, an affiliate of the English Department, provides writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course all relate to the subject matter of the companion course. These are credit-bearing courses offered in conjunction with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should call

the Campus Writing Center, 530-752-0431, for the current schedule of courses.

**Teaching Credential Subject Representative.** P. Moran. See also under Teacher Education Program.

**Graduate Study.** The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. 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 Adviser.** M.J. Hoffman.

**Subject A.** Students must have met the Subject A requirement before taking any course in English.

**Prerequisites.** English 1 or 3 is required for admission into courses 20, 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses, unless otherwise stated in the course listings. Course 45 is recommended as preparation for the 46 series and all upper division literature courses. Comparative Literature 1, 2, 3, or 4 may normally be substituted for English 1 or 3.

**Courses in English (ENL)**

**Lower Division Courses**

**\*A. Language Skills (2)**

Lecture/discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a letter grade. Minimum passing grade is a C; students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

**\*R. Communications Skills Workshop (0) I.**

The Staff (Chairperson in charge)  
 Lecture—4 hours; workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students from non-standard-English backgrounds who need to strengthen basic skills before taking English 57 (offered by Sacramento City College). Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

**1. Expository Writing (4) I, II, III.** The Staff

(Chairperson in charge)  
 Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**3. Introduction to Literature (4) I, II, III.** The Staff

(Chairperson in charge)  
 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).

**\*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)**

I, II, III. The Staff (Chairperson in charge).  
 Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in

\*Course not offered this academic year.

prescribed forms and in experimental forms of their own choosing. No final examination. GE credit: Wrt.

**5P. Introduction to Creative Writing: Poetry** (4) I, II, III. The Staff (Chairperson in charge) 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.

**18. Style in the Essay** (4) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—4 hours. Prerequisite: course 1 or 3 or the equivalent. Style, language, and structure in the essay. Instruction in analyzing style, developing a written voice, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**19. Writing Research Papers** (4) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—4 hours. Prerequisite: course 1 or 3 or the equivalent. Development of skills in critical reading, analysis, documentation, and writing needed for research-based assignments. Instruction provided in formulating research topics and in developing effective arguments. Reading and writing assignments may focus on a single theme. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**\*30A. Survey of American Literature** (4) I. Kramer Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1865. GE credit: ArtHum, Div, Wrt.

**\*30B. Survey of American Literature** (4) III. Hays Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. GE credit: ArtHum, Div, Wrt.

**45. Close Reading of Poetry** (4) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises. GE credit: Wrt.

**46A. Masterpieces of English Literature** (4) I. Cioffi; II. Schleiner Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. 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) I. Simpson; II. Johns; III. Byrd Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. 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) II. Moran; III. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. 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) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: course 1 or 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) I, II, III. The Staff (Chairperson in charge) Prerequisite: course 1 or 3. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

## Upper Division Courses

**100F. Creative Writing: Fiction** (4) I. Major; II. Williamson; III. Byrd and staff 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.

**100NF. Creative Writing: Non-Fiction** (4) II. Hicks Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 1 or 3, 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.

**100P. Creative Writing: Poetry** (4) I. McPherson; II. Gilbert; III. McPherson 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.

**101. Advanced Composition** (4) I, II, III. The Staff (Director of Composition in charge) Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Instruction for students in all disciplines in advanced principles of expository writing. Focus on writing tasks both within and beyond the academy. Assignments provide practice in a variety of modes of writing: narrative, analysis, explanation, argument, critique. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**102. Writing in the Disciplines** (4) I, II, III. The Staff (Director of Composition in charge) Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or 3 or the equivalent; concurrent enrollment in a specified course in a subject-matter discipline, acceptance into a specified major, or consent of instructor. Advanced instruction in the elements of expository writing with special emphasis on their application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with a different subject-matter course. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**104A. Writing in the Professions: Business Reports and Technical Communication** (4) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent, and upper division standing. Instruction designing, writing, and documenting formal and informal reports directed toward a variety of work-related audiences. Instruction in presenting data graphically. Suitable for students planning careers in science, government, business, engineering, or industry. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**104B. Writing in the Professions: Law** (4) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Instruction in advanced principles of critical thinking, argumentation, and style, with special emphasis on their application to situations in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**104C. Writing in the Professions: Journalism** (4) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Advanced instruction in writing non-fiction for magazines and newspapers, including problems of style and language. Special emphasis on conducting

research, interviewing, analyzing markets, and writing query letters. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**104D. Writing in the Professions: Elementary and Secondary Education** (4) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division standing. Advanced instruction in a variety of modes of expository writing, concentrating on topics related to teaching and issues in contemporary American education. Strongly recommended for teaching credential candidates. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**104E. Writing in the Professions: Science** (4) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: course 1 or 3 or the equivalent and upper division or graduate science curriculum. Advanced instruction in writing abstracts, research proposals, scientific papers, other forms of scientific communication and in presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).

**105. History of the English Language** (4) I. Schleiner; III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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.

**107. Freedom of Expression** (4) I. Abbott Lecture—3 hours; term paper. Prerequisite: course 1 or 3 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.

**\*110A. Introduction to Principles of Criticism** (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Essentials of literary criticism and its history from Aristotle to the modern era, with emphasis on the major critics. GE credit: Wrt.

**110B. Introduction to Principles of Criticism** (4) I. Simpson Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory. GE credit: Wrt.

**111. Medieval Literature** (4) I. Osborn Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused intensive examination of topics in medieval literature. May be repeated for credit when content differs. GE credit: Wrt.

**113A. Chaucer: Troilus and the "Minor" Poems** (4) III. Cioffi Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, *Troilus and Criseyde*. Courses 113A and 113B need not be taken in sequence. GE credit: Wrt.

**113B. Chaucer: The Canterbury Tales** (4) II. Osborn Lecture—3 hours; term paper. Prerequisite: course 1 or 3. *The Canterbury Tales* complete as a work of art. Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer. Courses 113A and 113B need not be taken in sequence. GE credit: Wrt.

**115. Renaissance Literature** (4) III. Abbott Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused



study of works of the Renaissance. May be repeated for credit when content differs. GE credit: Wrt.

**117A. Shakespeare: The Early Works (4) II.** Levin

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's early period, up to 1599. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

**117B. Shakespeare: The Middle Period (4) I.**

Zender; II. Schleiner; III. Waddington  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's middle period, up to 1604. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

**117C. Shakespeare: The Later Works (4) I.**

Schleiner; III. Levin  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's later period. Courses 117A-117B-117C need not be taken in sequence. GE credit: Wrt.

**118. Shakespeare (4) II.** Worthen

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works by Shakespeare. Recommended for non-majors. May not be applied toward the English major. GE credit: ArtHum, Wrt.

**122. Milton (4) II.** Waddington

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works, including *Paradise Lost*. GE credit: Wrt.

**123. 18th-Century British Literature (4) II.** Byrd

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of 18th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.

**130. British Romantic Literature (4) II.** Lokke

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of Romantic English literature. May be repeated for credit when content differs. GE credit: Wrt.

**133. 19th-Century British Literature (4) III.**

The Staff  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.

**137. 20th-Century British Literature (4) II.**

Moran  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 20th-century English literature. Authors who might be taught are Conrad, Joyce, Lawrence, Eliot, Woolf, Larkin. May be repeated for credit when content differs. GE credit: Wrt.

**142. Early American Literature (4) III.** Van Leer

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**143. 19th-Century American Literature to the Civil War (4) II.** Diehl

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century American literature. May be repeated for credit when content differs. GE credit: Wrt.

**144. Post-Civil War American Literature (4) I.**

Morris  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of post-Civil War American literature. May be repeated for credit when content differs. GE credit: Wrt.

**146. 20th-Century American Literature (4) I.**

Hicks; II. Hays; III. The Staff  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused

study of works of 20th-century American literature. May be repeated for credit when content differs. GE credit: Wrt.

**\*149. Topics in Literature (4) II.** Lokke

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit when content differs. GE credit: Wrt.

**150A. British Drama to 1800 (4) III.** Cioffi

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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.

**\*150B. British Drama from 1800 to the Present (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically focused study of works of British drama from 1800 to the present. May be repeated for credit when topic differs. GE credit: Wrt.

**\*152. American Drama (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of American dramatic literature. Either a historical survey from 18th-century beginnings to the present or an in-depth analysis of fewer playwrights, such as O'Neill, Miller, Williams. May be repeated for credit when content differs. GE credit: Wrt.

**\*153. Topics in Drama (4) I.** Worthen

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical or thematic study of drama. May be repeated for credit when topic differs. GE credit: Wrt.

**155A. 18th-Century British Novel (4) III.** Johns

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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.

**155B. 19th-Century British Novel (4) II.** Robson

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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 Brontës, Eliot, Hardy. GE credit: Wrt.

**\*155C. 20th-Century British Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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) II.** Vaz; III. Moran

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**158A. The American Novel to 1900 (4) I.** The Staff; III. Morris

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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) I.** Hays; III. Zender

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Historically or thematically organized examination of American novelists of the twentieth century; Faulkner, Hemingway, Fitzgerald, Morrison, and others. GE credit: Wrt.

**\*159. Topics in the Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**160. Film As Narrative (4) I.** The Staff

Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a storytelling medium. GE credit: ArtHum, Wrt.

**161A. Film History I: Origins to 1945 (4) I.**

The Staff (Chairperson in charge)  
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1 or 3. 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.

**161B. Film History II: 1945 to present (4) II.** The Staff (Chairperson in charge)

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1 or 3. 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) I.** The Staff

Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with a study of ten major works of international film art. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*165. Topics in Poetry (4) I.** Williamson; II. Diehl;

III. McPherson  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 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) III.** McPherson

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**\*167. Twentieth-Century African American Poetry (4) I.** The Staff (Chairperson in charge)

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Twentieth-century African American poetry, including oral and literary traditions. Authors covered may include Gwendolyn Brooks, Countee Cullen, Robert Hayden, and Langston Hughes. Offered in alternate years. GE credit: Div, Wrt.

**\*171A. The Bible as Literature: The Old Testament (4) II.** Robertson

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**\*171B. The Bible as Literature: Prophets and New Testament (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**\*173. The Literature of Science Fiction (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literary modes and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in this genre—e.g., time travel; alternative universes; utopian, anthropological, sociological science fiction. GE credit: ArtHum, Wrt.

**\*175. American Literary Humor (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3, 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) I. Hays  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Special Topics in Ethnic Literature** (4) I. Hoffman

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive study of a topic drawn from multiethnic literature. Course may focus on particular ethnic groups, historical periods, writers, genres, and/or themes. May be repeated once for credit when topic differs. GE credit: Div, Wrt.

**179. Multi-Ethnic Literature** (4) II. The Staff  
Lecture/discussion—3 hours; papers. Prerequisite: course 1 or 3, or standing above freshman level. Fiction, poetry, and other writings by Americans of ethnic minority background (Native, Black, Hispanic, Jewish, Italian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature. GE credit: Div, Wrt.

**180. Children's Literature** (4) III. The Staff  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**181A. African American Literature to the Harlem Renaissance** (4) I. The Staff

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. African American literature from the slavery period to the end of the 1930s. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition. Offered in alternate years. GE credit: Div, Wrt.

**181B. African American Literature from the Harlem Renaissance to the Present** (4) II. Major

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Major African American writers in the context of cultural history from 1940 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. Offered in alternate years. GE credit: Div, Wrt.

**182. Literature of California** (4) II. Hicks

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**184. Literature of the Wilderness** (4) III. Robertson

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the theme of wilderness primarily in American Literature, with some consideration of Biblical and European antecedents. Major attention given to Thoreau, Muir, London, Austin, Faulkner, Snyder, and Abbey. Offered in alternate years. GE credit: ArtHum, Wrt.

**185A. Literature by Women I** (4) II. Ferguson

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Bradstreet and Behn to the Brontës, Eliot, and Dickinson. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism. GE credit: Div, Wrt.

**185B. Literature by Women II** (4) III. Diehl

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3; course 185A recommended. English language literature by women from Chopin and Woolf to Plath, Rich, and Morrison. The effects of social con-

straints upon women's art; the rise of feminism; new trends in literary criticism. GE credit: Div, Wrt.

**187. Literature and the Other Arts** (4) II. Hays  
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of the relationship between the forms of literature and the forms of the other arts, with detailed study of one of the crucial periods of artistic development in western culture. GE credit: Wrt.

**188. Special Topics in Literary Studies** (4) I, III.

The Staff (Chairperson in charge)  
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of a special topic drawn from English or American literature. Course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment. GE credit: Wrt.

**189. Seminar in a Major Writer** (4) II, III.

The Staff (Chairperson in charge)  
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.

**192. Internship in English** (1-12) I, II, III.

The Staff (Chairperson in charge)  
Internship—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A maximum of 4 units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**194H. Special Study for Honors Students** (4) I. Morris

Seminar—3 hours; term paper. Prerequisite: admission to English Department Senior Honors Program. Study of a special literary topic or of the works of a major writer, and preparation for writing an honors thesis in course 195H.

**195H. Honors Thesis** (4) II. The Staff (Morris in charge)

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: one course from courses 1, 3, 5F, 5P. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

## Graduate Courses

**\*200. Techniques of Literary Scholarship** (4) II. The Staff

Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

**\*201. Literary Criticism** (4)

Discussion—3 hours; term paper. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

**205. Anglo-Saxon Language and Culture** (4) I. Osborn

Lecture—3 hours; conference and term paper. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. Offered in alternate years.

**\*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. Offered in alternate years.

**\*207. Middle English** (4) I. Osborn

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.

**\*209. Present-Day English Linguistics** (4)

Discussion—3 hours; term paper. Theory and methods of structural linguistics and transformational grammar as applied to the analysis of English. Emphasis will be on recent linguistic techniques, particularly as these relate to the teaching of language, literature, and composition.

**210. Readings in English and American Literature** (4) I. Hoffman

Seminar—3 hours; conference—1 hour. Prerequisite: upper division English course in area to be studied. Offered in multiple sections each quarter. Content varies according to speciality of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

**\*215. Middle English Romance** (4)

Seminar—3 hours; conference—1 hour. The sources of Medieval Romance genre. Continental and English literary treatment; significant changes of attitudes in post-Malory literature.

**\*225. Topics in Irish Literature** (4)

Seminar—3 hours; conference—1 hour. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

**230. Study of a Major Writer** (4) I. Zender; III. Ferguson

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) III. Moran  
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) III. Robertson and staff

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.

**234. Dramatic Literature** (4) I. Worthen

Seminar—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

**\*235. Theory of Fiction** (4) II. Hicks

Seminar—3 hours; preparation and evaluation of paper on a work of fiction. Theories of fiction as they relate to the professional writer's practice of the craft. Designed for students in the creative writing program.

**236. Poetics** (4) III. McPherson

Seminar—3 hours; conference—1 hour. Structure, prosody, and idiom of British and American poetry variably approached—sometimes through an intensive study of a single writer, sometimes historically or theoretically—at the instructor's discretion. Preparation and evaluation of research papers. Directed toward Creative Writing master's degree students. May be repeated for credit when different period or topic is studied.

**\*237. Modern Critical Theory (4)**

Seminar—3 hours; conference—1 hour. Examination of problems in the theory underlying the practice of literary criticism from I.A. Richards and T.S. Eliot to the present.

**\*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.

**\*240. Medieval Literature (4) II. Cioffi**

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.

**242. Sixteenth-Century Literature (4) II.**

Waddington

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) III. Worthen**

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.

**246. Seventeenth-Century Literature (4) II. Levin**

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.

**248. Eighteenth-Century Literature (4) I. Johns**

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.

**\*250. Romantic Literature (4) II. The Staff**

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.

**252. Victorian Literature (4) II. Robson**

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.

**254. Twentieth-Century British Literature (4) I.**

Williamson

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.

**256. Early American Literature (4) II. The Staff**

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.

**258. American Literature: 1800 to the Civil War (4) III. Van Leer**

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) III. Morris**

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.

**\*262. American Literature after 1914 (4) II.**

Williamson; III. Diehl

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.

**264. Studies in Modern British and American Literature (4) III. Gilbert**

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) II. Vaz**

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) II. Diehl**

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.

**290F. Seminar in Creative Writing of Fiction (4) I. Major; II. Byrd; III. The Staff**

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.

**\*290NF. Seminar in Creative Writing of Non-Fiction (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in the master's program in Creative Writing. A workshop in the writing of literary non-fiction, with emphasis—according to staff and student interest—on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives.

**290P. Seminar in Creative Writing of Poetry (4) I. Williamson; II. Gilbert; III. Snyder**

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.

**298. Directed Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge) (S/U grading only.)

**298C. Colloquium on Literary Scholarship (1-4) I, II, III. The Staff (Chairperson in charge)**

Oral presentation and critique of research papers. (S/U grading only.)

**299. Individual Study (1-12) I, II, III. The Staff**

(Chairperson in charge) (S/U grading only.)

**299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff**

(Chairperson in charge) (S/U grading only.)

**Professional Courses****\*300. Problems in Teaching English Language, Literature, and Composition in Secondary Schools (3)**

Lecture—3 hours. Prerequisite: graduate standing; an English teaching major or minor. This course should be completed in conjunction with practice teaching. Course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

**390. Theory and Practice of University-Level Composition Instruction (4) I. The Staff (Director of Composition in charge)**

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. (S/U grading only.)

**391. Teaching Creative Writing (2) I. Hicks**

Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program. 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.)

**\*392. Teaching Expository Writing (2) II.**

The Staff

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.)

**393. Teaching Literature and Composition (2) I.**

The Staff

Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program. 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.)

**396. Teaching Assistant Training Practicum (1-4) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Entomology

(College of Agricultural and Environmental Sciences)

Michael P. Parrella, Ph.D., Chairperson of the Department

James R. Carey, Ph.D., Vice Chairperson

Department Office, 367 Briggs Hall (530-752-0475)

World Wide Web: <http://entomology.ucdavis.edu>

**Faculty**

James R. Carey, Ph.D., Professor

Hugh Dingle, Ph.D., Professor

Lester E. Ehler, Ph.D., Professor

Bruce F. Eldridge, Ph.D., Professor

Jeffrey Granett, Ph.D., Professor

Bruce D. Hammock, Ph.D., Professor (*Entomology,*

*Environmental Toxicology*)

Richard Karban, Ph.D., Professor

Harry K. Kaya, Ph.D., Professor (*Entomology,*

*Nematology*)

Lynn S. Kimsey, Ph.D., Professor

Sharon P. Lawler, Assistant Professor

Susumu Maeda, Ph.D., Associate Professor

Fumio Matsamura, Ph.D., Professor (*Entomology,*

*Environmental Toxicology*)

Robert E. Page, Ph.D., Professor

Michael P. Parrella, Ph.D., Professor (*Entomology,*

*Environmental Horticulture*)

Christine Y. S. Peng, Ph.D., Professor

Jay A. Rosenheim, Ph.D., Associate Professor

Thomas W. Scott, Ph.D., Professor

Arthur Shapiro, Ph.D., Professor (*Entomology,*

*Evolution and Ecology*)

Diane E. Ullman, Professor

Philip S. Ward, Ph.D., Professor

**Emeriti Faculty**

Oscar G. Bacon, Ph.D., Professor Emeritus

Richard M. Bohart, Ph.D., Professor Emeritus

Norman E. Gary, Ph.D., Professor Emeritus

Albert A. Grigarick, Jr., Ph.D., Professor Emeritus

Charles L. Judson, Ph.D., Professor Emeritus  
 Harry H. Laidlaw, Jr., Ph.D., Professor Emeritus  
 W. Harry Lange, Jr., Ph.D., Professor Emeritus  
 G. A. H. McClelland, Ph.D., Senior Lecturer Emeritus  
 Donald L. McLean, Ph.D., Professor Emeritus  
 Timothy Prout, Ph.D., Professor Emeritus  
 Robbin W. Thorp, Ph.D., Professor Emeritus  
 Robert K. Washino, Ph.D., Professor Emeritus

### Affiliated Faculty

Anton Cornel, Ph.D., Lecturer  
 Mary L. Flint, Ph.D., Lecturer  
 Larry Godfrey, Ph.D., Lecturer  
 Eric C. Mussen, Ph.D., Lecturer  
 Richard E. Rice, Ph.D., Lecturer  
 Charles G. Summers, Ph.D., Lecturer  
 Frank G. Zalom, Ph.D., Lecturer

### The Major Program

The Entomology major is a general biological curriculum of interest to students intrigued by insects, their diversity and biology. Areas of emphasis include agricultural entomology, bee management and biology, behavior, ecology, insects affecting human and animal health, natural history, and physiology.

**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 arthropod pest management, for example, could enroll in courses such as economic entomology, biological control of insects, and apiculture.

**Internships and Career Alternatives.** Entomology majors have participated in internships with the State Department of Agriculture in the areas of insect identification, insect surveys, and the development of entomological libraries. Other interns have worked with professional entomologists in the area of supervised pest control. Graduates are prepared for managerial and technical positions with state and federal agencies and agricultural production or supporting industry; entomology graduates also teach biological sciences in high schools. Others matriculate in graduate programs leading to a higher degree.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable and may be critical for the attainment of some career goals. *Courses shown without parentheses are required.*)

|                                                                                                                                             |       |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>English Composition Requirement</b> .....                                                                                                | 0-8   |
| See College Requirement                                                                                                                     |       |
| <b>Preparatory Subject Matter</b> .....                                                                                                     | 46-47 |
| Biology (Biological Sciences 1A, 1B, 1C)....                                                                                                | 15    |
| Chemistry (Chemistry 2A, 2B, 8A, 8B).....                                                                                                   | 16    |
| Mathematics 16A .....                                                                                                                       | 3     |
| Physics (Physics 1A, 1B) .....                                                                                                              | 6     |
| Statistics (Statistics 13, 32, or Agricultural Systems and Environment 120) .....                                                           | 3-4   |
| Computer science or additional mathematics or statistics (Agricultural Systems and Environment 21, Engineering 5, or Mathematics 16B) ..... | 3     |
| <b>Breadth Subject Matter</b> .....                                                                                                         | 6-24  |
| Satisfaction of General Education requirement                                                                                               |       |
| <b>Depth Subject Matter</b> .....                                                                                                           | 32-36 |
| Cell or microbiology (Microbiology 102, Plant Biology 118, 148, Plant Pathology 120) .....                                                  | 4-5   |
| Biological Sciences 101 .....                                                                                                               | 4     |
| Ecology (Environmental Science and Policy 100 or Evolution and Ecology 101) .....                                                           | 4     |
| Evolution (Evolution and Ecology 100) .....                                                                                                 | 3-4   |
| Physiological chemistry (Biological Sciences 102 and 103) .....                                                                             | 6     |
| Entomology 100, 100L .....                                                                                                                  | 5     |
| At least 7 units from Entomology 101, 102, 103, 104, 107, 109, or 116 .....                                                                 | 7     |

|                                                                                                                                                        |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Restricted Electives</b> .....                                                                                                                      | 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. |    |

|                                        |       |
|----------------------------------------|-------|
| <b>Unrestricted Electives</b> .....    | 32-60 |
| <b>Total Units for the Major</b> ..... | 180   |

**Major Adviser.** J. Granett.

### Minor Program Requirements:

The Department of Entomology has seven 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 |
| <b>Entomology</b> .....                                                                        | 18-24 |
| Entomology 100, 100L .....                                                                     | 5     |
| At least two courses from Entomology 101, 102, 103, 104, 107 .....                             | 7-8   |
| At least two additional upper division Entomology courses (except courses 192, 198, 199) ..... | 6-11  |

|                                                                |       |
|----------------------------------------------------------------|-------|
|                                                                | UNITS |
| <b>Agricultural Entomology</b> .....                           | 18    |
| Entomology 100, 100L, 110, 135 .....                           | 14    |
| At least four additional upper division Entomology units ..... | 4     |

|                                                                                                  |       |
|--------------------------------------------------------------------------------------------------|-------|
|                                                                                                  | UNITS |
| <b>Apiculture</b> .....                                                                          | 17-22 |
| Entomology 100, 100L, 119 .....                                                                  | 8     |
| Entomology 104 or 110 .....                                                                      | 3-5   |
| Additional courses: choose two from Evolution and Ecology 121, Plant Biology 102, 173, 174 ..... | 6-9   |

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
|                                                                         | UNITS |
| <b>Insect Ecology</b> .....                                             | 19    |
| Entomology 100, 100L, 104 .....                                         | 8     |
| Seven units from Entomology 103, 107, 109...7                           |       |
| Evolution and Ecology 149 or Environmental Science and Policy 121 ..... | 4     |

|                                                                                                        |       |
|--------------------------------------------------------------------------------------------------------|-------|
|                                                                                                        | UNITS |
| <b>Medical-Veterinary Entomology</b> .....                                                             | 18    |
| Entomology 100, 100L, 104, 153, 156 .....                                                              | 15    |
| At least three units from Entomology 156L; Pathology, Microbiology and Immunology 126, 126L, 128 ..... | 3     |

**Minor Adviser.** J. Granett.

**Graduate Study.** The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See the Graduate Studies section and the *Graduate Announcement* for further details.

**Graduate Advisers.** See *Class Schedule and Room Directory*.

**Related Courses.** See courses in Nematology.

### Courses in Entomology (ENT)

#### Lower Division Courses

**10. Natural History of Insects** (3) II. Kaya, Parrella  
 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.

**17. Evolution and Behavior** (4) III. Dingle/Page  
 Lecture—3 hours; discussion—1 hour. Introduction to the theory of natural selection, using evaluations and applications of behavioral adaptations, ranging from insects to humans. GE credit: SciEng, Wrt.

#### 90X. Special Topics in Entomology

(2) I, II, III.  
 The Staff  
 Seminar—2 hours. Freshman seminar for in-depth examination of a special topic in entomology.

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 (P/NP grading only.)

#### Upper Division Courses

**100. General Entomology** (3) I. L. Kimsey  
 Lecture—3 hours. Prerequisite: Biological Sciences 1B. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: SciEng.

**100L. General Entomology Laboratory** (2) I. L. Kimsey  
 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.

**101. Functional Insect Morphology** (3) II. Peng  
 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.

**102. Insect Physiology** (4) III. The Staff  
 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.

**103. Insect Systematics** (3) III. Ward  
 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. GE credit: SciEng, Wrt.

**104. Behavioral Ecology of Insects** (3) II. Page  
 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.

**107. California Insect Diversity** (5) III. L. Kimsey  
 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.

**\*109. Field Taxonomy and Ecology** (7) Extra-session summer. Ward  
 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.

**110. Arthropod Pest Management** (5) II. Granett  
 Lecture—3 hours; laboratory—6 hours. 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.

**111. Insects and Human Affairs** (4) III. Ullman  
 Lecture—2 hours; discussion—1 hour; film/demonstration—1 hour; one required evening meeting. Prerequisite: Biological Sciences 10 recommended. Diversity, structure and function of insects. Their role as benefactors, competitors, and destroyers of human resources and health. Their contribution to human culture and scientific knowledge.



Approaches to insect pest control and its environmental, social and political correlates. GE credit: SciEng, Wrt.

**116. Biology of Aquatic Insects** (3-5) III. Lawler  
Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes. GE credit: SciEng.

**119. Apiculture** (3) III. Peng  
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.

**\*123. Plant-Virus-Vector Interaction** (3) I. Lucas, Gilbertson, Ullman

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.)

**\*135. Introduction to Biological Control** (4) III. Ehler, Kaya

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.

**\*147. Evolution of Life on Earth** (4) I. L. Kimsey  
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 10 or Biological Sciences 10. Relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years. GE credit: SciEng, Wrt.

**153. Medical Entomology** (4) I. Scott  
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne human diseases and principles of their control. GE credit: SciEng, Wrt.

**156. Biology of Parasitism** (3) III. R. Kimsey, Theis, Westerdahl  
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.

**156L. Biology of Parasitism Laboratory** (1) III. R. Kimsey in charge  
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.

**192. Internship** (1-12) I, II, III, extra session. The Staff (Chairperson in charge)  
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) I, II, III. The Staff  
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) I, II, III, summer. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, summer. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

**\*206. Ecology of Insect Parasitoids** (4) II. Rosenheim  
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 behavior, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological hypotheses emphasized. Offered in alternate years. (Same course as Population Biology 206.)

**212. Molecular Biology of Insects and Insect Viruses** (3) II. Maeda  
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.

**225. Terrestrial Field Ecology** (4) III. Karban  
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.)

**230. Advanced Biological Control** (4) III. Ehler  
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.

**253. Advanced Medical Entomology** (3) III. The Staff  
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 arthropod-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.

**290. Special Topics in Entomology** (1-4) I, II, III. The Staff (Chairperson in charge)  
Seminar—1-4 hours. Prerequisite: consent of instructor.

**291. Seminar in Medical Entomology** (2) I. Eldridge, Scott, R. Kimsey  
Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated for credit.

**292. Seminar in Insect Physiology** (2) I. Hammock, Maeda  
Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest to insect physiology and biochemistry. May be repeated for credit.

**293. Seminar in Systematic Entomology** (2) III. Ward, Kimsey  
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematics and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions. May be repeated for credit.

**294. Seminar in Insect Ecology** (2) III. Carey, Ehler, Karban, Dingle, Rosenheim  
Seminar—2 hours. Prerequisite: a general ecology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the



distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches. May be repeated for credit.

**295. Seminar in Agricultural Entomology (2) II.** Ehler, Granett, Parrella, Rosenheim  
Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest insect population management. May be repeated for credit.

**296. Seminar in Bee Biology (2) I.** Page, Peng  
Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apoidea) with emphasis on the honeybee. May be repeated for credit.

**297. Seminar in Insect Behavior (2) III.** Dingle, Page  
Seminar—2 hours. Prerequisite: a course in animal behavior. Analysis of contemporary advances in insect behavior, interpretation and description of observations, physiological mechanisms, functional kinds of behavior, application of general principles to the solution of problems in the laboratory and field. May be repeated for credit.

**298. Group Study (1-5) I, II, III.** The Staff  
(Chairperson in charge)  
(S/U grading only.)

**299. Research (1-12) I, II, III, summer.** The Staff  
(Chairperson in charge)  
(S/U grading only.)

## Environmental and Resource Sciences

(College of Agricultural and Environmental Sciences)

**Faculty.** See under departments of Agricultural and Resource Economics, Agronomy and Range Science, and Land, Air and Water Resources.

### The Major Program

The environmental and resource sciences major is a program for study of the biological, chemical, and physical features of environmental resources, and the economical and social considerations associated with their use, conservation, protection, and management and restoration. Students who choose this major include those with an interest in careers associated with environmental resource utilization and management, as well as those pursuing post-baccalaureate, academic, or professional training.

**The Program.** The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. At the same time, certain courses are required in the basic physical and biological sciences areas. Upper division general environmental resource sciences courses, a resource economics course, and a specified number of units of environmental and resource-oriented courses are required for all students in the major. Students select environmental and resource-oriented courses in consultation with and approval of the student's adviser. Considerable care should be taken to ensure effective utilization of the flexibility of the major, and to meet individual academic and career objectives. Students may specialize their study by selecting of one of the options within the major or, in consultation with their adviser, pursuing other specializations.

**Internships and Career Alternatives.** Positions now held by graduates in environmental and resource sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental specialists with government agencies, municipalities, and private firms. A significant proportion of graduates undertake further studies leading to advanced degrees in resources, the environment, and related fields.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

#### UNITS

**Written/Oral Expression .....0-8**  
See College requirement

**Preparatory Subject Matter .....53-63**

Atmospheric Science 60 .....4  
Biological sciences (Biological Sciences 1A-1B-1C).....15  
Chemistry (Chemistry 2A-2B).....10  
Environmental quality (Environmental Toxicology 10) .....3  
Geology (Geology 1 or 50).....3  
Mathematics (Mathematics 16A-16B or 21A-21B) .....6-8  
Students are encouraged to take the advanced series—consult with your adviser.

Microcomputer skills, computer programming (Agricultural Systems and Environment 21, 121, Engineering 5, Computer Science Engineering 10, 15) .....6-7

Physics (Physics 1A-1B or 9A-9B-9C—see option requirements) .....6-12  
Students are encouraged to take the advanced series—consult with your adviser.

Statistics (Statistics 13) .....4

**Breadth/General Education .....24**

Satisfaction of General Education requirements; additional units in social sciences and humanities to total 24 units.

**Depth Subject Matter .....24-27**

Written expression (in addition to college requirement), (English 101, 104) .....3-4  
Agricultural and Resource Economics 147 or 148 .....3-4  
Environmental and Resource Sciences 131...3  
Soil Science 100 .....4  
Hydrologic Science 100 or Environmental and Resource Sciences 121 .....3-5  
Social-political awareness (Environmental Science and Policy 161, 179; Environmental Toxicology 138, Geography 161, Geology 134, Wildlife, Fish and Conservation Biology 154) .....3-4  
Plant or animal ecology (Entomology 104, Environmental Science and Policy 100, Plant Biology 117, Plant Science 101, Zoology 125).....3-4

#### Areas of Specialization (choose one)

**Air Resource Option .....34**

Directed towards a general understanding of the atmosphere as a finite resource and of environmental problems currently faced by humankind. The option provides a broad understanding of the physical and chemical properties of the atmosphere, including the impacts of air pollution and global climate change. Employment opportunities include positions within federal, state, and county agencies concerned with environmental quality and with private companies.

Atmospheric Science 30, 60, 110, 124, 133 .....17  
Atmospheric Science 192 (Internship).....3  
Environmental Science and Policy 110 .....4  
Environmental and Resource Science 131...3  
Geography 116 .....4  
Additional electives (Environmental Science and Policy 116, Geography 115, Environmental and Resource Sciences 103) .....3  
Unrestricted electives (to total 180) .....19-34

**Environmental Resources Option .....39-43**

For the general study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, protection and management. For those who plan careers associated with resource uti-

lization and management, and those pursuing post-baccalaureate, academic, or professional training.

Statistics (Agricultural Systems and Environment 120, Environmental Science and Policy 123) .....3-4

Environmental and Resource Sciences 192...3

Upper division resource-oriented courses chosen in consultation and with approval of adviser .....18-24

Environmental and Resource Sciences upper division breadth courses (choose from three of the following areas).....9-12

Agricultural economics, agronomy and range science, animal science, botany, agricultural engineering, civil and environmental engineering, economics, environmental horticulture, environmental studies, environmental toxicology, geography, geology, plant science, range management, environmental and resource science, soil science, water science, wildlife, fish and conservation biology, and zoology.

**Unrestricted electives (to total 180) .....10-29**

**Energy Systems Option .....28**

Provides a general, semi-technical appreciation of the roles and importance of energy conversion systems to industrial societies and the associated environmental (physical-biological) impacts of existing technologies. Appropriate preparation for careers with utilities, monitoring and environmental quality agencies.

Environmental Science and Policy 1, 126, 167, 169 (select three courses) .....12

Atmospheric Science 131 .....4

Environmental and Resource Sciences 3 .....3

Environmental and Resource Sciences 103...3

Environmental and Resource Sciences 192 (Internship).....3

**Unrestricted Electives .....25-40**

**Hydrobiology Option .....32-35**

Training in the biological aspects of water resources focusing on the understanding and protection of polluted and unpolluted water systems; the structure, function, and principles of aquatic systems. Graduates may seek employment with state and federal agencies such as Water Resources Control Board, Department of Fish and Game, Department of Water Resources, or consulting firms concerned with environmental impacts.

Hydrologic Science 122, 122L .....5

Plant Biology 118 .....4

Entomology 116 .....5

Wildlife, Fish and Conservation Biology 120, 120L .....4

Hydrologic Science 134 or 136.....3

Hydrologic Science 192 (Internship) .....3

Additional electives (Environmental Science and Policy 123, 151 and 151L, Environmental Toxicology 101, Hydrologic Science 21, 141, Wildlife, Fish and Conservation Biology 153) .....6-10

**Unrestricted Electives (to total 180) .....18-36**

**Land and Water Management Option.....24-28**

A broad background in management of soil and water resources in both natural and agricultural ecosystems. Emphasis on analysis of soils and plants for estimating crop nutrient requirements and principles of irrigation and drainage of agricultural land. Appropriate for those seeking employment with state and federal agencies or with agroindustry.

Soil Science 109, 118.....7

Hydrologic Science 103, 110 .....6

Soil Science 192 or Hydrologic Science 192 (Internship).....3

Additional Soil Science or Hydrologic Science courses selected with adviser's approval .....6-10

**Unrestricted Electives .....25-44**

**Total Units for the Major .....180**

**Major Adviser.** J. Stasulat (South Hall).

**Advising Center** for the major is located in 148 Hoagland Hall (530-752-1669).

**Related Courses.** See courses listed under Agricultural and Resource Economics, Agricultural Systems and Environment, Animal Science, Entomology, Environmental Biology and Management, Environmental Science and Policy, Environmental Toxicology, Evolution and Ecology, Geography, Geology, Hydrologic Science, Plant Biology, Range Science, Soil Science, Wildlife, Fish and Conservation Biology.

## Courses in Environmental and Resource Sciences (ERS)

*Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 148 Hoagland Hall (530-752-1669).*

### Lower Division Courses

**10. California: The State (3) III.** Stasulat  
Lecture—3 hours. Prerequisite: introductory geology or geography recommended. Introduction to geomorphology, physiography and natural resources of California. Interrelated impacts of terrain, climate and resources upon essential human activities. Analysis of the fundamental concepts and methods of inquiry guiding existing resource management policies. GE credit: SocSci.

**10G. California: The State (Discussion) (1) III.** Stasulat  
Discussion—1 hour; brief essays. Prerequisite: course 10 concurrently. Small group discussion of topics assigned for course 10. Preparation and discussion of essays. GE credit with concurrent enrollment in course 10: Wrt.

**60. Global Environmental Interactions (3) II.** Southard/Nathan  
Lecture—2 hours; discussion—1 hour. Prerequisite: high school algebra and biology or chemistry. Relationships among climate, hydrology, biogeochemical cycles, and vegetation distribution in diverse landscapes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator. GE credit: SciEng, Wrt.

**92. Resource Sciences Internship (1-12) I, II, III.** The Staff (Chairperson in charge)  
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) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**100. Principles of Hydrologic Science (4) I.** Grismer  
Lecture—4 hours. Prerequisite: Chemistry 2B, Mathematics 16B, Physics 5A 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.

**100L. Principles of Hydrologic Science Laboratory (2) I.** Grismer  
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.

**105. Principles of Cartography for GIS (4) III.** Bahre  
Lecture—2 hours; laboratory—6 hours. Properties and components of maps. Compilation and generalization

of base-map data; projections; coordinate systems; reference ellipsoids; symbolization and processing of map data; cartographic design; typography; map production; and cartographic and photographic equipment utilized in producing maps.

**121. Water and Society (3) I.** Silk  
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.

**131. Air as a Resource (3) II.** Flocchini  
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.

**136. Chemistry of the Hydrosphere (3) III.** Tanji  
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.)

**144. Trees and Forests (3) I.** Barbour, Berry, Bledsoe, DeJong  
Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. 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. (Former course 106.) (Same course as Plant Biology 144/Environmental Horticulture 144.)

**173. Humans and Vegetation Change (4) II.** Bahre  
Lecture—3 hours; term paper. Prerequisite: course 60 or Biological Sciences 1A, or consent of instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural-historical and ecological approaches to the evolution of wild landscapes, factors of plant distribution, mapping of vegetation, world vegetation patterns, human impact on major regions, and case studies of land-use and vegetation change.

**185. Aerial Photo Interpretation and Remote Sensing (4) I.** Bahre  
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.

**186. Environmental Remote Sensing (3) II.** Ustin  
Lecture—3 hours. Prerequisite: upper division course in soil science, hydrologic science, environmental studies, or the plant sciences. 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.)

**192. Resource Sciences Internship (1-12) I, II, III.** The Staff (Chairperson in charge)  
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) I, II, III.**

The Staff  
Independent study. Prerequisite: senior standing, overall GPA of 3.25 or higher and consent of master adviser. Two or three successive quarters of guided research on an environmentally related subject of special interest to the student. (Deferred grading only, pending completion of thesis.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

## Environmental Biology and Management

(College of Agricultural and Environmental Sciences)

### Faculty

See under the Department of Environmental Science and Policy.

### The Major Program

The environmental biology and management major offers an education in the basic natural sciences, especially ecology, together with a set of management and public policy analysis courses. 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 in the United States and worldwide.

**The Program.** Courses in chemistry, physics, mathematics, biology, and earth sciences form the foundation of the curriculum; these are then tied together by courses in ecology. Computing, statistics, and other methods courses give the student basic quantitative research skills. Economics, political science, and techniques of quantitative management offerings dominate the management and public policy requirements.

A moderate degree of specialization is permitted in three upper division options. Students in the *Conservation Biology and Management* option take courses in conservation biology, genetics, evolution and biogeography, resource economics, environmental policy making, quantitative analysis and field experience. This option emphasizes the study of biological diversity and the natural and human processes that control it. Key areas of the option include the design of nature reserves, the management of small populations of endangered species, environmental law, policy and economics.

Students in the *Environmental Biology* option take course work in population ecology, physiology, and other biological specialties, as well as quantitative analysis.

Students in the *Environmental Management* option take courses in recreation, resource economics, planning and public policy, and, especially, quantitative management techniques. This option emphasizes the management of public lands and natural resources in wildland and rural areas. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the Environmental Policy Analysis and Planning major.

**Career Alternatives.** The major prepares students to enter careers in management of natural resources and public lands, as well as basic ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, such as organic chemistry. Graduates who chose the Environmental Biology

option are prepared for graduate or professional training and, eventually, careers working for public agencies and private firms specializing in environmental quality, natural resources, or ecological research. Graduates with the Environmental Management option are prepared for jobs in public agencies at the federal, state, or local levels.

## B.S. Major Requirements:

(The *usual* courses taken to satisfy requirements are shown in parentheses. Equal or more comprehensive courses may be taken with the adviser's written approval. *Courses shown without parentheses are required.*) Students are required to plan their course selection with their adviser.

### UNITS

#### English Composition Requirement.....6-15

See College requirement .....0-8  
Additional English (English 102 concurrently with Environmental Science and Policy 1) .....3  
Oral expression (Communication 1 or Dramatic Art 10) .....3-4

#### Preparatory Subject Matter .....49-54

Biological sciences (Biological Sciences 1A, 1B, 1C) .....15  
Chemistry (Chemistry 2A-2B or 2AH-2BH) ..10  
Computer science (Agricultural Systems and Environment 21, or Computer Science Engineering 10, 15, or 30) .....3-4  
Environmental analysis (Environmental Science and Policy 1 or 30; choose Environmental Science and Policy 1 if the Environmental Management option is selected) .....3-4  
Policy analysis (Political Science 1, or Economics 1A; choose Economics 1A if Environmental Management option is selected) .....4-5  
Mathematics (Mathematics 16A-16B or 21A-21B) .....6-8  
Physics (Physics 7A-7B or 9A-9B) .....8

#### Breadth/General Education.....12-24

Satisfaction of General Education requirement to include 12 units of humanities and/or Civilization and Culture.....12-24

#### Depth Subject Matter .....26-32

(These units must be taken for a letter grade attaining an overall grade-point average of 2.0 or higher.)

Ecology (Select one of Plant Biology 117, Environmental Science and Policy 100, Evolution and Ecology 101, Wildlife, Fish and Conservation Biology 151) .....3-4  
Survey of environmental science, Environmental Science and Policy 110 .....4  
Physical processes in the environment (Select two courses from: Atmospheric Science 120, Environmental Science and Policy 150A, Environmental and Resource Sciences 131, Geology 134, Hydrologic Science 100, 141, Soil Science 100) .....6-8  
Environmental studies (Select one course from Environmental Science and Policy 161, 163, 166, 171, 179; Agricultural and Resource Economics 147, 175, 176) ..3-4 (Choose Agricultural and Resource Economics if Environmental Management option is selected.)

Management of Public Lands, Environmental Science and Policy 172 .....4

Mathematics and/or Statistics (Select one course from: Mathematics 16C, 21C, 22A, 22B, Agricultural Systems and Environment 120, Statistics 102 **OR** upper division mathematics, computing or statistics. Environmental Management students should enroll in Agricultural Systems and Environment 120, or Statistics 102 .....3-4

Research methods—Environmental Science and Policy 123, 128, 178, Wildlife, Fish and Conservation Biology 100. Management students should enroll in Environmental Science and Policy 178 .....3-5

#### Areas of Specialization.....25-38

##### Conservation Biology and Management Option

Conservation biology, Wildlife, Fish and Conservation Biology 154 .....4  
Genetics, Biological Sciences 101 .....4  
Evolution and biogeography. Choose one from Entomology 147, Evolution and Ecology 100, 102, 138, 147, 149, Geology 107 .....3-4  
Resource economics, Agricultural and Resource Economics 176 or Environmental Science and Policy 175 .....3 (Students must select a course which was not taken in "Depth Subject Matter.")  
Environmental policy making. Choose one from Agricultural and Resource Economics 147, Environmental Science and Policy 161, 166, 171, 172 .....3-4 (Students must select a course which was not taken in "Depth Subject Matter.")  
Quantitative analysis, Environmental Science and Policy 121 or Wildlife, Fish and Conservation Biology 122 .....4  
Field experience. Choose from Environmental Science and Policy 123, 124, 151L, 155L, Wildlife, Fish and Conservation Biology 100, 102 .....3-10 (Students may select Biological Sciences 122 or a course at an approved field station or an off-campus field biology research site.)

##### Environmental Biology Option

Behavioral ecology (Choose one from: Anthropology 154A, Entomology 104, Evolution and Ecology 137, Neurobiology, Physiology and Behavior 102, Psychology 150, Wildlife, Fish, and Conservation Biology 140) .....3-5

Evolution and genetics (Choose one from: Biological Sciences 101, Evolution and Ecology 100, Geology 107) .....3-4  
Quantitative analysis (Mathematics 22A-22B, upper division mathematics or statistics) .....6-8

Taxonomy, including laboratory experience (Entomology 103, Evolution and Ecology 112-112L, Plant Biology 102, 108, 116, Wildlife, Fish and Conservation Biology 110, 111, 111L, 120) .....4-8

Note: Most of these courses require one or two additional chemistry or basic physiology courses as prerequisites. Plan a sequence in consultation with adviser.

Physiology, including laboratory experience. Choose from: Entomology 102, Neurobiology, Physiology and Behavior 101, Plant Biology 111, Wildlife, Fish and Conservation Biology 121 .....3-5

Advanced environmental biology. Choose two courses from the following: Avian Sciences 100, Environmental Science and Policy 121, 151, 151L, 150B, 150C, 155, 155L, Evolution and Ecology 149, Hydrologic Science 122, 122L, Plant Biology 102, 117, Wildlife, Fish and Conservation Biology 100, 120, 122, 130 .....6-8

##### Environmental Management Option

Resource policy evaluation (see adviser) ...4  
Microeconomics, Economics 100 or 104 or Agricultural and Resource Economics 100A .....5  
Bureaucratic policy making, Environmental Science and Policy 166, or Political Science 182 .....4  
Environmental management, Environmental Science and Policy 179 .....3  
Statistical analysis, Agricultural and Resource Economics 106 or Sociology 106, or Statistics 108 .....4

Management of a natural resource, choose two courses from one of the following three groups.....6-8

##### Animal Resources:

Agricultural Systems and Environment 135, or Wildlife, Fish and Conservation Biology 110, 111, 120, 122, 151, 154, or Environmental Science and Policy 123.

##### Forest and Rangeland Resources:

Agricultural Systems and Environment 131, 134.

##### Air, Water, and Soil Resources:

Environmental and Resource Sciences 131, or Hydrologic Science 21, 103, 122, 141, or Soil Science 118, or Environmental Science and Policy 151 and 151L, 155 and 155L.

#### Unrestricted Electives .....20-62

#### Total Units for the Degree.....180

**Major Adviser:** J.F. Quinn (*Environmental Science and Policy*).

## Minor Program Requirements:

The faculty for Environmental Biology and Management offers a minor in Recreation for students in Physical Education, Psychology, Sociology, or Human Development; students in Landscape Architecture desiring to specialize in recreation area design; Community and Regional Development students wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in public recreation policy analysis and management; Agricultural and Managerial Economics students wishing to go into the administration of commercial recreation enterprises; and those students in Plant Science interested in park landscape construction and maintenance.

### UNITS

#### Recreation .....18-20

Resource economics (Agricultural and Resource Economics 147, 176, Economics 123) .....3-4  
Urban recreation programs (Environmental Planning and Management 134) .....3-4  
Recreation policy analysis (see adviser)....4  
Recreation administration (Agricultural and Resource Economics 112, Community and Regional Development 163, Political Science 183, 189 .....4  
Internship in Recreation Management, Environmental Science and Policy 192 .....4

**Minor Adviser.** R.A. Johnston (*Environmental Science and Policy*).

## Courses in Environmental Biology and Management

*Questions pertaining to courses in Environmental Biology and Management should be directed to the Environmental Biology and Management advising office, 2134 Wickson Hall. See also Environmental Planning and Management listing following Environmental Horticulture.*



## Environmental Design

(College of Agricultural and Environmental Sciences)  
 Jo Ann Stabb, M.A., Chairperson, Design Program  
 Dean MacCannell, Ph.D., Chairperson, Landscape Architecture Program  
 Department Office, 142 Walker Hall (530-752-6223)  
 World Wide Web:  
<http://ucdenvdes.ucdavis.edu/envdes/default.html>

**Faculty.** See faculty listings under Design and Landscape Architecture.

**Programs of Study.** See the undergraduate majors in Design and Landscape Architecture and the graduate program in Textile Arts and Costume Design (information pertaining to Textile Arts and Costume Design graduate courses is listed under the Design major).

**Related Courses.** See Design and Landscape Architecture course lists.

## 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, 174 Physics/Geology Building.

### Minor Program Requirements:

|                                                                                                                   | UNITS        |
|-------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Environmental geology</b> .....                                                                                | <b>22-24</b> |
| 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 145 ..... | 6-8          |

**Minor adviser:** K. Versosub, Department of Geology, 378 Physics/Geology Building, 752-6911.

## Environmental Horticulture

(College of Agricultural and Environmental Sciences)  
 David W. Burger, Ph.D., Chairperson of the Department  
 Department Office, 140 Environmental Horticulture Building (530-752-0130)  
 World Wide Web: <http://envhort.ucdavis.edu>

### Faculty

Michael G. Barbour, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Alison M. Berry, Ph.D., Associate Professor  
 David W. Burger, Ph.D., Associate Professor  
 Don J. Durzan, Ph.D., Professor  
 Richard Y. Evans, Ph.D., Lecturer

Seymour M. Gold, Ph.D., Professor  
 James A. Harding, Ph.D., Professor  
 J. Heinrich Lieth, Ph.D., Associate Professor  
 James D. MacDonald, Ph.D., Professor (*Plant Pathology*)

Michael P. Parrella, Ph.D., Professor (*Entomology*)  
 Michael S. Reid, Ph.D., Professor  
 Lin L. Wu, Ph.D., Professor

### Emeriti Faculty

Thomas G. Byrne, M.S., Lecturer Emeritus  
 Richard W. Harris, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Charles E. Hess, Ph.D., Professor Emeritus  
 Anton M. Kofranek, Ph.D., Professor Emeritus  
 Andrew T. Leiser, Ph.D., Professor Emeritus  
 John H. Madison, Jr., Ph.D., Professor Emeritus  
 Jack L. Paul, Ph.D., Professor Emeritus  
 Roy M. Sachs, Ph.D., Professor Emeritus

### Affiliated Faculty

Thomas Ledig, Ph.D., Lecturer  
 Greg McPherson, Ph.D., Lecturer  
 Truman P. Young, Ph.D., Lecturer

**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 in specialize in Floriculture/Nursery Management, Urban Forestry, Landscape Horticulture 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 is available to students in other majors.

**Career Alternatives.** Opportunities in this field include growing and/or managing plants in a variety of settings, consulting as an urban 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        |
|------------------------------------------------------------------------|--------------|
| <b>Environmental Horticulture</b> .....                                | <b>22-24</b> |
| Environmental Horticulture 6 .....                                     | 3            |
| Plant Biology 171 .....                                                | 4            |
| Environmental Horticulture 105 or 107 .....                            | 4            |
| Select two courses from Environmental Horticulture 125, 130, 133 ..... | 7-9          |
| Environmental Planning and Management 110 or 134 .....                 | 4            |

**Minor Advisers:** J.A. Harding or D.W. Burger.

**Related Undergraduate Programs.** See the undergraduate majors in Environmental Horticulture and Urban Forestry, Agricultural Systems and Environment, and Environmental Biology and Management;

**Graduate Study.** For graduate study, refer to the Graduate Studies chapter of this catalog.

**Related Courses.** See Plant Biology.

## Courses in Environmental Horticulture (ENH)

### Lower Division Courses

**1. Introduction to Environmental Horticulture/Urban Forestry** (3) I. Burger  
 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.

**6. Introduction to Environmental Plants** (3) I. The Staff

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Introduction to the 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 the development and maintenance of cultivars. Identification of 150 common landscape plants.

**\*10. Landscape Horticulture for the Home and Community** (3) III. The Staff

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

**92. Internship** (1-12) I, II, III. The Staff (Department Chairperson in charge)  
 Internship—3-36 hours. Prerequisite: lower division standing, Biological Sciences 1C or Plant Biology 12, and consent of instructor. Work experience off or on campus in flower and nursery crop production, and marketing, landscape horticulture, and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Upper Division Courses

**100. Urban Forestry** (4) I. McPherson  
 Lecture—2 hours; laboratory—3 hours; term paper. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 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.

**102. Physiological Principles in Environmental Horticulture** (4) III. Burger  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, turf culture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments.

**105. Taxonomy and Ecology of Environmental Plant Families** (4) III. Harding  
 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.

**120. Management of Container Media** (3) I. Evans  
 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.

**125. Greenhouse and Nursery Crop Production** (5) II. Lieth  
 Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

**130. Turfgrass and Amenity Grassland Utilization and Management** (4) III. Wu  
 Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Biological Sciences 10 or Agricultural Systems and Environment 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



Develop understanding of basic principles of biotechnology of woody perennials. Cell and tissue culture methods and current process control problems are emphasized. Recombinant DNA methods covered where appropriate. Develop analytical evaluation skills. Review trends in commercialization.

**\*241. Analysis of Horticultural Problems (3) III.**  
The Staff

Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, chemical agents, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation. Offered in alternate years.

**290. Seminar (1) I, II, III.** The Staff (Chairperson in charge)

Seminar—1 hour. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which include plant morphogenesis, floriculture, greenhouse production and modeling, landscape plant ecology, arboriculture, turf culture, post harvest, plant breeding, etc. (S/U grading only.)

**290C. Research Group Conference (1) I, II, III.**  
The Staff

Discussion—1 hour. Prerequisite: students in a plant science graduate program. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which includes plant morphogenesis, floriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding related to environmental horticulture. (S/U grading only.)

**297T. Tutoring in Environmental Horticulture (1-4) I, II, III.** The Staff (Chairperson in charge)

Tutoring—4-8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and/or consent of instructor. Leading discussion sessions, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conference on subject matter and instructional techniques. May be repeated for credit by tutoring in different courses.

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: graduate standing. (S/U grading only.)

**Professional Course**

**396. Teaching Assistant Training Practicum (1-4) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Courses in Environmental Planning and Management (ENP)**

*Questions pertaining to the following courses should be directed to the instructor.*

**Upper Division Courses**

**110. Urban and Regional Planning (4) II.** Gold (Environmental Horticulture)  
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope and significance of planning in America, with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation, and the profession.

**134. Recreation Planning (4) III.** Gold  
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, principles, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

**Environmental Horticulture and Urban Forestry**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Environmental Horticulture.

**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.

**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, consulting as an urban horticulturist, business ownership, working for public agencies or private landscape firms/corporations, park management and landscape contracting.

**B.S. Major Requirements**

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses listed without parentheses are required.*)

UNITS

**English Composition Requirement.....0-8**  
See College Requirement

**Preparatory Subject Matter.....61-66**

- Environmental Horticulture 1 and 6.....6
- Landscape Architecture 30.....4
- Biological Sciences 1C.....5
- Agricultural Systems and Environment 2....4
- Environmental Science and Policy 30.....3
- Physical sciences (Chemistry 2A-2B, Physics 1A-1B).....16
- Resource sciences (Select two courses from Atmospheric Science 5, Environmental and Resource Sciences 10, 60, Geography 1, Geology 1, 50).....6-8
- Social sciences/Humanities (Select two courses from Geography 2, Landscape Architecture 1, 2, Nature and Culture 1, Psychology 1, Sociology 1, 2).....7-9
- Quantitative skills (Agricultural Systems and Environment 21 and either Mathematics 16A or Statistics 13).....6-7

**Breadth/General Education.....6-24**

**Depth Subject Matter.....33-35**

- Environmental Horticulture 102.....4
- Soil Science 100.....4
- Plant Biology 171.....4
- Resource sciences (Select two courses from Environmental Horticulture 144, Environmental and Resource Sciences 121, 131, 173, Soil Science 109).....6-7
- Social sciences and planning (Select two courses from Anthropology 133, Environ-

- mental Planning and Management 110, 134, Environmental Science and Policy 171, Nature and Culture 100, Political Science 100, 107, Psychology 144).....8
- Plant systematics (Environmental Horticulture 105 or Plant Biology 102 or 108).....4-5
- Internship, Environmental Horticulture 192 (minimum of 3 units).....3

**Areas of Specialization (Choose One)**

**Urban Forestry Option.....28**

- Environmental Horticulture 100, 130, 133...11
- Entomology 110.....5
- Evolution and Ecology 121.....4
- Geography 155.....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 Biology 142.....4
- Plant Pathology 120.....4

**Landscape Management/Turf Option.....27**

- Environmental Horticulture 130, 133.....8
- Applied Biological Systems Technology 165.....2
- Entomology 110.....5
- Evolution and Ecology 117.....4
- Plant Pathology 120, 125.....8

**Plant Biodiversity/Restoration Option.....22-31**

- Select two courses from Environmental and Resource Sciences 173, Plant Biology 102, 108, 116, Wildlife, Fish and Conservation Biology 156.....8-10
- Select two courses from Environmental Horticulture 144, Environmental Science and Policy 155, Evolution and Ecology 117, 121, Plant Biology 121, Wildlife, Fish and Conservation Biology 157.....6-8
- Environmental Horticulture 107 or 150, or Evolution and Ecology 100.....3-4
- Entomology 103 or 107.....3-5
- Agricultural Systems and Environment 130 or 150 or Landscape Architecture 180F.....2-4

**Total Units for the Major.....116-132**

**Major Adviser.** J.A. Harding.

**Environmental Planning and Management**

**See Environmental Biology and Management; Environmental Horticulture; and Environmental Horticulture and Urban Forestry**

**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 EPAP major; to do so, please see the major

adviser, S.I. Schwartz (2140 Wickson Hall) or staff adviser, D. DuMont (2134 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:**

(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. *Courses shown without parentheses are required.*)

UNITS

**English Composition Requirement.....10-11**  
 See College requirement .....0-8  
 Additional English (English 102 concurrently with Environmental Science and Policy 1) .....3  
 Oral expression (Communication 1 or Dramatic Art 10) .....3-4

**Preparatory Subject Matter .....51-58**  
 Biological sciences (Biological Sciences 1A or 10) .....4-5  
 Chemistry (Chemistry 2A, 2B) .....10  
 Computer science (Agricultural Systems and Environment 21, Engineering 5, Computer Science Engineering 10, 30) .....3-4  
 Economic principles (Economics 1A, 1B) ..10  
 Environmental science/agriculture (Animal Science 1, Biological Sciences 1B, Geology 1, Hydrologic Science 100, 124, Plant Biology 12, Soil Science 100) .....3-5  
 Environmental studies (Environmental Science and Policy 1) .....4  
 Mathematics (Mathematics 16A-16B or 21A-21B) .....6-8  
 Physics (Physics 1A) .....3  
 Political science (Political Science 1) .....4  
 Statistics (Statistics 13, 32) .....3-4

**Breadth/General Education.....6-24**  
 Satisfaction of General Education requirement

**Depth Subject Matter .....37-40**  
 (Students must take these units on a letter grade basis, and must attain an overall grade point average of 2.0 or higher in the Depth Subject Matter courses.)  
 Environmental Science and Policy 110, 160, 164, 166, 168A .....21  
 Environmental Science and Policy 161, 173 .....3-4  
 Environmental Science and Policy 171 or 179 .....3-4  
 Research methods, Environmental Science and Policy 178 or Sociology 103, 106 or Agricultural and Resource Economics 106 or Statistics 108 .....7-8  
 Economic analysis, Economics 100 or 104 or Agricultural and Resource Economics 100A; and Agricultural and Resource Economics 176 .....7-8

**Areas of Specialization (choose one) .....17-23**

**Advanced Policy Analysis Option**  
 Political institutions (Political Science 102, 105, 108, 155) .....4

Political behavior (Political Science 164, 165, 170) .....4  
 Science policy (Environmental Science and Policy 165) .....4  
 Policy evaluation research (Environmental Science and Policy 168B) .....4  
 Policy evaluation (Civil and Environmental Engineering 153, 160, Agricultural and Resource Economics 155, Economics 130) .....3-4

**City and Regional Planning Option**

Urban design (Art History 168, Environmental Planning and Management 110; Landscape Architecture 40 recommended) .....3-4  
 Urban geography (see adviser) .....4  
 Transportation planning (Civil and Environmental Engineering 160) .....3  
 Environmental impact assessment (Soil Science 118, Environmental Science and Policy 179) .....3-4  
 Urban economics (see adviser) .....4  
 Urban politics (Political Science 102, 100) ...4  
 (Enroll for Environmental Science and Policy 173 for law requirement under Depth Subject Matter above.)

**Energy Policy Option**

Environmental health (Environmental Science and Policy 126, Environmental Toxicology 101) .....4  
 Nuclear hazards (see adviser) .....3  
 Energy technology (Engineering 160) .....4  
 Solar energy (Environmental and Resource Sciences 103) .....3  
 Economics of energy (Environmental Science and Policy 175) .....4  
 Energy policy (Environmental Science and Policy 167) .....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.

**Recreation Policy Option**

Internship in Recreation Management, Environmental Science and Policy 192 .....4  
 Public Land Management, Environmental Science and Policy 172 .....4  
 Urban recreation programs (Environmental Planning and Management 134) .....3-4  
 Recreation policy analysis (see adviser) ...4  
 Recreation administration (Agricultural and Resource Economics 112, Community and Regional Development 163, Political Science 183, 189) .....4

**Transportation Planning Option**

Urban structure (Economics 125 or see adviser) .....4  
 Transportation planning (Civil and Environmental Engineering 160) .....3  
 Transportation engineering and analysis (Civil and Environmental Engineering 161, Environmental Science and Policy 168B) .....3-4  
 Energy policy (Environmental Science and Policy 167, Engineering 160) .....4  
 Air quality (Environmental and Resource Sciences 131) .....3  
 Energy and environmental aspects of transportation (Environmental Science and Policy 163) .....3

**Water Quality Option**

Water resource management (Environmental Science and Policy 126, Environmental Toxicology 101) .....4  
 Water pollution (Hydrologic Science 21, Soil Science 120) .....2-3  
 Freshwater systems (Hydrologic Science 122, Environmental Science and Policy 151) .....3-4  
 Field and laboratory methods (Hydrologic Science 122L, Environmental Science and Policy 151L) .....2-3  
 Water chemistry (Environmental and Resource Sciences 136) .....3-4  
 Hydrology (Hydrologic Science 141) .....3

**Unrestricted Electives .....24-59**  
**Total Units for the Degree.....180**

**Major Adviser.** S.I. Schwartz (*Environmental Science and Policy*).

**Minor Program Requirements**

The faculty for environmental policy analysis and planning offers the following two minors. The Energy Policy minor is for students from any major seeking basic training in energy technology, impacts and policy analysis methods applied to energy systems. The Environmental Policy Analysis minor is for natural and social science students desiring basic training in policy analysis theory and methods.

UNITS

**Energy Policy .....18-19**  
 Preparation: Economics 1A; basic course in political science.  
 Engineering 160 .....3-4  
 Environmental Science and Policy 126 or Environmental Toxicology 101 .....4  
 Environmental and Resource Sciences 103 or Environmental Science and Policy 115 ...3  
 Environmental Science and Policy 175 .....4  
 Environmental Science and Policy 167 or Political Science 171 .....4

UNITS

**Environmental Policy Analysis .....23-24**  
 Preparation: Economics 1A; basic course in political science.  
 Environmental Science and Policy 110, 160, 161, 166, 168A .....20  
 Environmental Science and Policy 171 or 179 .....3-4

**Minor Adviser.** S.I. Schwartz (*Environmental Science and Policy*).

**Environmental Science and Policy**

(College of Agricultural and Environmental Sciences)  
 Alan M. Hastings, Ph.D., Chairperson of the Department  
 Department Office, 2132 Wickson Hall  
 (530-752-3026)

**Faculty**

- Theodore C. Foin, Jr., Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
- Charles R. Goldman, Ph.D., Professor
- Susan P. Harrison, Ph.D., Associate Professor
- Alan M. Hastings, Ph.D., Professor
- Robert A. Johnston, M.S., Professor
- David F. Layton, Ph.D., Assistant Professor
- Benjamin S. Orlove, Ph.D., Professor
- James F. Quinn, Ph.D., Professor
- Eliska Rejmankova, Ph.D., Associate Professor
- Peter J. Richerson, Ph.D., Professor
- Paul A. Sabatier, Ph.D., Professor
- Thomas W. Schoener, Ph.D., Professor (*Evolution and Ecology*)

\*Course not offered this academic year.

Seymour I. Schwartz, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Daniel Sperling, Ph.D., Professor (*Environmental Science and Policy, Civil and Environmental Engineering*)  
 Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor (*Environmental Science and Policy, Political Science*), *Academic Senate Distinguished Teaching Award*  
 Marca Weinberg, Ph.D., Assistant Professor

### Emeriti Faculty

William J. Hamilton III, Ph.D., Professor Emeritus  
 Jack D. Ives, Ph.D., Professor Emeritus

### Affiliated Faculty

Christine Schonewald, Ph.D., Associate Adjunct Professor

## 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 Biology 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, although highly motivated undergraduates who find existing majors unsuited to their educational objectives are encouraged to contact the chairperson and faculty of the department regarding individual majors in the College of Agricultural and Environmental Sciences (see Individual Major).

**Current Information.** Through its continuing contacts with many other departments and teaching divisions on the campus, the department develops each year a variety of special courses and workshops 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 faculty of the department offers the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as instruction through the graduate programs of the disciplines with which they are associated, such as agricultural and resource economics, evolution and ecology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the chairperson of the Graduate Group in Ecology.

**Graduate Adviser.** J. Henier Lieth (*Ecology*).

## Courses in Environmental Science and Policy (ESP)

(Formerly courses in *Environmental Studies*.)

### Lower Division Courses

**1. Environmental Analysis** (4) II. Weinberg and staff

Lecture—3 hours; discussion—1 hour. Prerequisite: English 1; English 102, Economics 1A, 1B, Biological Sciences 1A, and Political Science 1 recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as food production, energy development and conservation, pollution, and the conservation of natural environments. Emphasis on analysis of problems and the consequences of proposed solutions.

**10. Introduction to Environmental Studies** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man–environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not open for credit to students who have taken course 1. GE credit: SciEng, Wrt.

**30. The Global Ecosystem** (3) III. The Staff  
 Lecture—3 hours; 1 one-day field trip. Prerequisite: Biological Sciences 10 or Geography 1 or Anthropology 2. The interaction of climate and biotic adaptation and the production of ecological systems. The limits and opportunities for human use of different natural environments, and human utilization of the earth's biotic resources. GE credit: SciEng.

### 30G. The Global Ecosystem:

**Laboratory/Discussion** (2) III. The Staff  
 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) I, II, III. The Staff (Department Chairperson in charge)  
 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) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

**100. General Ecology** (4) I. Harrison  
 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.

**101. Human Ecology** (4) II. Richerson, Mulder  
 Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30, Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) GE credit: SocSci, Div.

### (a) Environmental Science

**110. Principles of Environmental Science** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 5A, 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.

**116. The Oceans** (3) I. Spero; II. Cowen  
 Lecture—3 hours. Introductory survey of the marine environment; oceanic physical phenomena, chemical constituents, geological history, the sea's biota, and utilization of marine resources. (Same course as Geology 116.) GE credit: SciEng.

**116G. The Oceans: Discussion** (2) I. Spero; II. Cowen  
 Discussion—2 hours. Prerequisite: course 116/Geology 116 concurrently. Scientific method applied to the discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. (Same course as Geology 116G.) GE credit with concurrent enrollment in course 116: Wrt.

### (b) Ecological Analysis

**121. Population Ecology** (4) II. Hastings  
 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.

### 123. Introduction to Field and Laboratory Methods in Ecology

(4) III. Quinn  
 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.

### 124. Marine and Coastal Field Ecology

(10) Extra-session summer. Chow  
 Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—18 hours (Summer Session I). Prerequisite: Biological Sciences 1A; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological theory and problems with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

**125A. Field Ecology** (4) III. Quinn  
 Lecture—15 hours; discussion—10 hours; field work—15 hours (for two-week period). Prerequisite: consent of instructor. Designed to instruct and demonstrate to students the value and approaches of experimental research using the hypothetico-deductive experimental approach. May be taken only as part of the White Mountain Research Supercourse.

**125B. Physiological Ecology** (4) III. Quinn  
 Lecture—15 hours; discussion—10 hours; laboratory—15 hours (for two-week period). Prerequisite: consent of instructor. An examination of the functional means by which animals and plants cope with their environments, the physiological limits that determine the boundary conditions of various ecological niches. Unifying principles that describe the regulatory features of all animals or plants emphasized. May be taken only as part of the White Mountain Research Supercourse.

**125C. Applied Conservation Biology** (4) III. Quinn

Lecture—15 hours; discussion—10 hours; field work—15 hours (for two-week period). Prerequisite: consent of instructor. Designed to introduce students to the complexities, and realities, of natural resource exploitation and preservation, emphasizing the trade-offs between economic benefits and ecosystem stability and sustainability. May be taken only as part of the White Mountain Research Supercourse.

### 126. Environmental and Occupational Epidemiology

(4) I. Beaumont  
 Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Methods and contemporary issues in environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other hazards on human populations. Discussion of epidemiologic study designs, biases, and risk assessment.

### \*128. Analysis and Simulation of Complex Systems

(3) III. Foin  
 Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of simulation models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

**\*128L. Modeling Complex Systems** (3) III. Foin  
 Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 128 concurrently. Simulation modeling using DYNAMO. Students complete a series of exercises from model formulation to model experiments and develop a term project of their own choosing.

### (c) Cultural Ecology

**133. Cultural Ecology** (4) III. Orlove  
 Lecture—3 hours; discussion—1 hour. 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 more complex environments. (Same course as Anthropology 133.) GE credit: SocSci, Div, Wrt.

**\*140. Mountain Geocology I (Physical Geography)** (3) II. The Staff

Lecture—3 hours. Prerequisite: introductory course in physical geology (Geology 50 or the equivalent); ecology (course 100); or consent of instructor. Broad overview of world mountain systems, including tectonics and structure, climate and vegetation, geomorphic processes and natural hazards. Will integrate relevant sections of cognate disciplines to focus on three-dimensional character of mountain regions—a physical geography of mountains.

**\*141. Mountain Geocology II (Human Geography)** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 140 or consent of instructor. Analysis of traditional adaptations of mountain cultures to their habitats; resource use and environmental degradation; tourism impacts and Third World development issues. Emphasis on Himalaya; also Andes, Alps and Rocky Mountains, provide historical perspective and discussion of current environmental crises.

*(d) Aquatic Ecosystems Analysis*

**150A. Physical and Chemical Oceanography**

(4) I. McClain, Spero  
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.)

**150B. Geological Oceanography** (3) II. McClain (Geology)

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.)

**150C. Biological Oceanography** (3) III. The Staff  
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use of and impact on the ocean. (Same course as Geology 150C.) Offered in alternate years.

**151. Limnology** (4) III. C. Goldman

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.

**151L. Limnology Laboratory** (3) III. C. Goldman  
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.

**155. Wetland Ecology** (3) I. Rejmankova

Lecture—3 hours. Prerequisite: course 100 or Botany 117; 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.

**155L. Wetland Ecology Laboratory** (3) I. Rejmankova

Lecture—1 hour; laboratory—6 hours; fieldwork—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.

*(e) Environmental Policy Analysis*

**160. Environmental Decision Making** (4) II. Sabatier

Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, intermediate statistics, course 1 and course 166 or Political Science 182; upper division standing or consent of instructor. Alternative models of environmental policymaking, and application to case studies of decision making in the U.S. and California.

**161. Environmental Law** (4) II. Wandesforde-Smith

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); English 1 and Political Science 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.

**163. Energy and Environmental Aspects of Transportation** (3) II. Sperling

Lecture—3 hours. Prerequisite: Civil and Environmental Engineering 160 recommended. 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.)

**164. Ethical Issues in Environmental Policy** (3) III. Sabatier

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.

**\*165. Science, Experts and Public Policy** (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 160 or Political Science 108 recommended. Analysis of factors affecting the influence of scientists, planners, and other experts in policymaking. Several cases and controversies will be examined.

**166. Policymaking in Natural Resource Agencies** (4) I. Wandesforde-Smith

Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, Statistics 13. Analysis of factors affecting decision making within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasizes critical examination of written materials. GE credit: Wrt.

**\*167. Energy Policy** (4) I. The Staff

Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 160; course 160 or Political Science 101, 107, or 109. Overview of U.S. energy policy; policy analysis, philosophy and methods; major policy issues, such as renewable vs. nonrenewable; and applied studies of power plants, solar residential, and state policy options. Offered in alternate years.

**168A. Methods of Environmental Policy Evaluation** (5) I. Schwartz

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.

**168B. Methods of Environmental Policy Analysis** (4) III. Schwartz

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.

*(f) Environmental Planning*

**170. Conservation Biology Policy** (4) III. Layton  
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.

**171. Environmental Planning** (4) III. Johnston  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in environmental science. Laws, institutions, design and analysis methods, and means of implementation of plans for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

**172. Public Lands Management** (4) II. Layton  
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.

**173. Land Use and Growth Controls** (4) III. Johnston

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** (3) II. Johnston  
Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (groundwater, forests, fisheries and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Agricultural and Resource Economics 175.)

**178. Applied Research Methods** (4) II. Weinberg  
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.

**179. Environmental Impact Reporting** (3) I. Johnston

Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing; Biological Sciences 1A; one course from the following: course 1, 10, 110, Environmental Toxicology 10, or Environmental and Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing; review and management of impact reports in the context of rational democratic planning systems.

*(g) Other Courses*

**190. Workshops on Environmental Problems**

(1-8) I, II, III. The Staff  
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.)

**192. Internship** (1-12) I, II, III. The Staff (Department Chair person in charge)  
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) I, II, III.**  
The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**212A. Environmental Policy Process (4) III.**  
Sabatier

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) II.**  
Schwartz

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.)

**220. Tropical Ecology (3) III.** Rejmankova  
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.

**\*228. Advanced Simulation Modeling (3) III.**  
Foin

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.

**\*228L. Modeling Laboratory (3) III.** Foin  
Laboratory—2 hours; modeling and computing—7 hours. Prerequisite: courses 128-128L; course 228 concurrently. Continuation of course 128L. Students expected to complete series of exercises on advanced topics in modeling and a term project based on their graduate research.

**252. Sustainable Transportation Technology and Policy (3) III.** Sperling

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. Offered in alternate years. (Same course as Civil and Environmental Engineering 252.)

**278. Research Methods in Environmental Policy (3) II.** Sabatier

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. Offered in alternate years.

**298. Directed Group Study (1-5) I, II, III.**  
The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: graduate standing. (S/U grading only.)

## Environmental Studies

See Environmental Science and Policy

## Environmental Toxicology

(College of Agricultural and Environmental Sciences)  
Fumio Matsumura, Ph.D., Chairperson of the Department

Department Office, 4138 Meyer Hall (530-752-1142)  
World Wide Web: <http://www.envtox.ucdavis.edu>

### Faculty

M. Judith Charles, Ph.D., Assistant Professor  
Michael S. Denison, Ph.D., Associate Professor  
Bruce D. Hammock, Ph.D., Professor (*Environmental Toxicology, Entomology*)  
Fumio Matsumura, Ph.D., Professor  
Marion G. Miller, Ph.D., Associate Professor  
Robert H. Rice, Ph.D., Professor  
Takayuki Shibamoto, Ph.D., Professor  
Barry W. Wilson, Ph.D., Professor (*Environmental Toxicology, Avian Sciences*)  
Dorothy E. Woolley, Ph.D., Professor (*Environmental Toxicology, Neurobiology, Physiology and Behavior*)

### Emeriti Faculty

Richard G. Burau, Ph.D., Professor Emeritus  
Donald G. Crosby, Ph.D., Professor Emeritus  
Dennis P. H. Hsieh, Sc.D., Professor Emeritus  
Ming-yu Li, Ph.D., Lecturer Emeritus  
James N. Seiber, Ph.D., Professor Emeritus  
Way W. Winterlin, M.S., Lecturer Emeritus

### Affiliated Faculty

Gary N. Cherr, Ph.D., Lecturer  
Norman A. Kado, Ph.D., Assistant 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 the environmental fate and biological activity of compounds. 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 perturbed by toxicants, toxicologists can

better estimate adverse effects. Overall, the program teaches students how knowledge of the origin, fate and action of toxic agents helps toxicologists evaluate the risk of adverse effects and balance risks 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.

**Internships and Career Alternatives.** Occupations that use environmental toxicology include industrial hygiene, environmental health and safety, monitoring and field sampling, residue or forensic analysis, pest control, pharmaceutical or food additive toxicity testing and research, risk assessment and managing regulatory compliance. 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 or medical school, as well as to 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:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible; equivalent or more comprehensive courses may be substituted with adviser's approval. *Courses shown without parentheses are required.*)

|                                                                                                                                                                                                                                                                           |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                           | UNITS        |
| <b>English Composition Requirement</b> .....                                                                                                                                                                                                                              | <b>0-8</b>   |
| See College requirement                                                                                                                                                                                                                                                   |              |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                   | <b>61-69</b> |
| Biological sciences (Biological Sciences 1A, 1B, 1C).....                                                                                                                                                                                                                 | 15           |
| Chemistry (Chemistry 2A-2B-2C, or 2AH-2BH-2CH and 118A-118B-118C or 128A-128B-128C).....                                                                                                                                                                                  | 24-27        |
| Computer science (Agricultural Systems and Environment 21).....                                                                                                                                                                                                           | 3            |
| Environmental sciences (Environmental Toxicology 10 or Environmental Science and Policy 10).....                                                                                                                                                                          | 3-4          |
| Mathematics (Mathematics 16A-16B or 21A-21B).....                                                                                                                                                                                                                         | 6-8          |
| Physics (Physics 1A-1B or 7A-7B).....                                                                                                                                                                                                                                     | 6-8          |
| Statistics (Statistics 100).....                                                                                                                                                                                                                                          | 4            |
| <b>Breadth/General Education</b> .....                                                                                                                                                                                                                                    | <b>36</b>    |
| 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.)..... | 24           |
| Additional breadth in humanities and social sciences.....                                                                                                                                                                                                                 | 12           |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                         | <b>29-30</b> |
| Genetics and/or Biochemistry (Biological Sciences 101, 102, 103).....                                                                                                                                                                                                     | 6-7          |
| Environmental Toxicology 101, 112A-112B, 114A-114B, 138 and (128, 130A-E, 131, 132, 135, or 146).....                                                                                                                                                                     | 23           |
| <b>Restricted/Other Electives</b> .....                                                                                                                                                                                                                                   | <b>24</b>    |
| Electives selected for area of specialization with adviser's approval.                                                                                                                                                                                                    |              |
| <b>Unrestricted Electives</b> .....                                                                                                                                                                                                                                       | <b>13-30</b> |
| <b>Total Units for the Degree</b> .....                                                                                                                                                                                                                                   | <b>180</b>   |

**Major Adviser.** M.S. Denison.

**Advising Center** for the major, is in 4137 Meyer Hall (530-752-1042).

**Minor Program Requirements:**

UNITS

**Environmental Toxicology** .....18  
 Environmental Toxicology 101, 112A, 114A, 138 .....12  
 Elective courses 6 units minimum, selected from Environmental Toxicology 10, 128, 130A-E, 131, 132, 135, 146, 190, 198 and 199 (4 units combined maximum of 190, 198 and 199 with adviser approval).....6

**Minor Adviser.** T. Shibamoto.

**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 and Molecular Biology, and Agricultural and Environmental Chemistry. For information on graduate study, contact the Advising Office or the appropriate graduate adviser. See also the Graduate Studies chapter of this catalog.

**Graduate Advisers.** A.R. Buckpitt, J.A. Last, M.G. Miller (*Pharmacology and Toxicology*), T. Shibamoto (*Agricultural and Environmental Chemistry*).

**Related Courses:** See Atmospheric Science 160, Biological Sciences 19, Chemistry 115, Environmental Science and Policy 10, 126, 161, Hydrologic Sciences 21, 134, 182, Environmental and Resource Sciences 136, Wildlife, Fish and Conservation Biology 153.

**Courses in Environmental Toxicology (ETX)****Lower Division Courses**

**10. Introduction to Toxicology** (3) I. The Staff  
 Lecture—3 hours. Open to science and non-science majors. Study of some natural and man-made toxic substances in personal, occupational, community, and global environments. Emphasis placed upon occurrence, properties, and effects of toxic substances. Biological and physical factors which alter fate of substances are described. GE credit: SciEng.

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
 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) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**101. Principles of Environmental Toxicology** (3) I. Denison  
 Lecture—3 hours. Prerequisite: Chemistry 8B, 118B, or 128B, and Biological Sciences 1A. The fate, consequences, and assessment of toxicants in environmental and biological systems; classes of environmental toxicants discussed include pesticides, air and water pollutants, phytotoxins, mycotoxins, food-borne toxicants, and heavy metals. GE credit: SciEng.

**112A. Toxicants in the Environment** (3) II. The Staff  
 Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformations; action of environmental forces which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. GE credit: SciEng.

**112B. Toxicants in the Environment** (4) III. Shibamoto  
 Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2C; course 112A; consent of instructor. Continuation of 112A. Toxic chemicals—primarily pollutants—in the environment; concepts and techniques of sampling, detecting, and measuring toxicants of current concern; collection, interpretation, and use of analytical data. Limited enrollment. Environmental

Toxicology majors will be given preference for enrollment. GE credit: SciEng.

**114A. Biological Effects of Toxicants** (3) II. Rice  
 Lecture—3 hours. Prerequisite: course 101 and Biological Sciences 102; Neurobiology, Physiology and Behavior 101 recommended. Illustrates the biological effects of toxic substances in living organisms. Topics covered include metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. GE credit: SciEng.

**114B. Biological Effects of Toxicants: Experimental Approaches** (4) III. Miller  
 Lecture/discussion—2 hours; discussion/laboratory—4 hours. Prerequisite: course 114A and consent of instructor if non-major. Illustrates basic principles of toxicology and acquaints students with laboratory techniques for evaluating potential toxicity of chemicals. Continuation of course 114A. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment. GE credit: SciEng.

**128. Food Toxicology** (3) III. Shibamoto, Russell (Food Science and Technology)  
 Lecture—3 hours. Prerequisite: Biological Sciences 102 and 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 Food Science and Technology 128.) GE credit: SciEng.

**130A-E. Selected Topics in Environmental Toxicology** (3) I, II, III. The Staff (Chairperson in charge)  
 Lecture/discussion—3 hours. Prerequisite: consent of instructor; course 101 recommended. Selected topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize such areas as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and the safe handling of toxic substances.

**131. Air Pollutants and Inhalation Toxicology** (3) III. Kado  
 Lecture—3 hours. Prerequisite: Chemistry 8B (may be taken concurrently) or the equivalent; Biological Sciences 102 recommended. Toxicology of air pollutants in the ambient and occupational environments. Environmental fates, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants. GE credit: SciEng.

**\*132. Chromatography for Analytical Toxicology** (4) II. The Staff  
 Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 8B or the equivalent (may be taken concurrently); consent of instructor. Application and theory of basic chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology; residue analysis comprises one-third of course.

**135. Health Risk Assessment of Toxicants** (3) I. The Staff  
 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.

**138. Legal Aspects of Environmental Toxicology** (3) II. The Staff  
 Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 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 governmental control. GE credit: SocSci.

**146. Exposure and Dose Assessment** (3) III. The Staff  
 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. GE credit: SciEng.

**190. Seminar** (1) I, II, III. The Staff (Chairperson in charge)  
 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.)

**190C. Research Group Conference** (1) I, II, III. The Staff  
 Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
 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) I, II, III. The Staff (Chairperson in charge)  
 Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing, minimum GPA of 3.25, 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) I, II, III. The Staff (Chairperson in charge)  
 Laboratory—6-9 hours; discussion—1 hour. Prerequisite: senior standing, minimum GPA of 3.25, and consent of instructor. Continuation of course 194HA-194HB. (P/NP grading only.)

**197T. Tutoring in Environmental Toxicology** (1-5) I, II, III. The Staff (Chairperson in charge)  
 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) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 (P/NP grading only.)

**Graduate Courses**

**\*203. Environmental Toxicants** (4) II. The Staff  
 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.

**214. Mechanisms of Toxic Action** (3) III. Hammock, Denison  
 Lecture—3 hours. Prerequisite: Biological Sciences 102, 103 and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

**220. Analysis of Toxicants** (3) I. Charles  
 Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.



**\*220L. Analysis of Toxicants Laboratory (2) I.**

The Staff

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.

**228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) II.** Shibamoto

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.

**\*234. Neurophysiological Basis of Neurotoxicology (3) I.** Woolley

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.)

**240. Ecotoxicology (3) III.** Matsumura

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, modelling, and field research. Selected case histories are analyzed and presented in class.

**290. Seminar (1) I, II, III.** The Staff (Chairperson in charge)

Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.)

**290C. Advanced Research Conference (1) I, II, III.** The Staff (Chairperson in charge)

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.)

**297T. Tutoring in Environmental Toxicology (1-5) I, II, III.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Epidemiology

See **Epidemiology and Preventive Medicine (under Medicine, School of);** and **Medicine and Epidemiology**

## Epidemiology (A Graduate Group)

Wesley O. Johnson, Ph.D., Chairperson of the Group  
Group Office, 2108 Tupper Hall (Department of  
Medicine and Epidemiology) (530-752-8340;  
Fax: 530-752-0414)

**Faculty.** Includes members from the Departments of Medicine and Epidemiology, Epidemiology and Preventive Medicine, Population Health and Reproduction, the Division of Statistics, Institute of Toxicology and Environmental Health, and other related departments in the Schools of Medicine, Veterinary Medicine, Graduate School of Management, and the College of Agricultural and Environmental Sciences.

**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; chronic and infectious disease epidemiology; epidemiologic methods; health services and economics; and metabolic, nutritional, reproductive and wildlife epidemiology. For detailed information regarding the program, address the chairperson of the group.

**Graduate Advisers.** E. Gold (*Epidemiology and Preventive Medicine*), M. Thurmond (*Medicine and Epidemiology*), J. Utts (*Statistics*).

**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, Population Health and  
Reproduction 404

**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 290  
Preventive Veterinary Medicine 210A, 210B, 405, 406  
Statistics 130A-130B

Select two courses from the three groups below—  
one from (a) and one from (b) or (c):

- (a) Population Health and Reproduction  
202 or Statistics 144
- (b) Epidemiology 222 or 223
- (c) Population Health and Reproduction  
203

**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****210A. Analytic Epidemiology I: Case-Control Studies (3) II.** Kass

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.)

**210B. Analytic Epidemiology II: Cohort Studies (3) III.** Kass

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.)

**220. Problems in Epidemiologic Study Design**

(4) III. Gold

Lecture—3 hours; term paper. Prerequisite: Preventive Veterinary Medicine 405 and 406 or the equivalent; Population Health and Reproduction 207 concurrent; 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.

**\*222. Epidemiological Modeling (3) II.**

Carpenter

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.

**223. Spatial Epidemiology (3) II.** Carpenter

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.

**240. Principles of Injury Epidemiology (3) I.**

Romano

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.

**250. Introduction to Clinical Research Design and Epidemiology (1) I.** McCurdy, Romano

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.)

**\*251. Environmental Epidemiology (3) II.** Gold

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.

**260. Epidemiology of Chronic Diseases and Aging (3) II.** Haan

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.

**\*270. Research Methods in Occupational****Epidemiology (3) III.** Beaumont

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.

**271. Epidemiology of Diseases and Injuries in Agriculture (3) III.** Beaumont

Lecture/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405, or consent of instructor. Overview of disease and injury hazards in agriculture with emphasis on epidemiologic studies. Topics include respiratory diseases, zoonoses, occupational injuries, child injuries, suicide, stress, pesticide injuries and illnesses, infectious disease hazards, reproductive hazards, and cancer hazards. Offered in alternate years.

**290. Seminars in Epidemiology**

(1) III. The Staff  
Seminar—1 hour. Students will actively participate in presentation and discussion of ongoing or published research projects in epidemiology. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff  
Seminar—1-5 hours. Group study in selected areas of epidemiology.

**299. Research** (1-12) I, II, III. The Staff  
Research in selected areas of epidemiology. (S/U grading only.)

## Exercise Science

(College of Letters and Science)

Edmund M. Bernauer, Ph.D., Chairperson of the Department

Department Office, 264 Hickey Gymnasium (530-752-0511)

### Faculty—Exercise Science

David Hawkins, Ph.D., Assistant Professor  
Robert G. Holly, Ph.D., Senior Lecturer  
Paul A. Molé, Ph.D., Professor  
Melvin R. Ramey, Ph.D., Professor (*Civil and Environmental Engineering*)  
Keith R. Williams, Ph.D., Associate Professor

### Faculty—Physical Education

G. Robert Biggs, B.A., Supervisor  
Gary Colberg, M.A., Principal Recreation Supervisor  
Kathleen M. DeYoung, B.A., Supervisor  
Pamela L. Gill-Fisher, M.A., Supervisor  
Raymond S. Goldbar, M.A., Supervisor  
Barbara A. Jahn, M.S., Supervisor  
Phillip S. Swimley, M.A., Supervisor  
Deanne M. Vochatzer, M.A., Associate Supervisor  
Jon E. Vochatzer, M.S., Supervisor  
Suzanne C. Williams, M.S., Supervisor

### Emeriti Faculty

William C. Adams, Ph.D., Professor Emeritus  
Edmund M. Bernauer, Ph.D., Professor Emeritus  
Charles R. Kovacic, Ed.D., Professor Emeritus  
Willard S. Lotter, Ed.D., Senior Lecturer Emeritus  
E. Dean Ryan, Ed.D., Professor Emeritus

### Affiliated Faculty—Exercise Science

Paul B. Salitsky, Ph.D., Lecturer  
James D. Shaffrath, M.D., Lecturer/Staff Research Associate

### Affiliated Faculty—Physical Education

Stephen T. Bronzan, M.S., Lecturer/Coach  
Jorja E. Hoehn, M.S., Lecturer/Coach  
Jeff Hogan, B.A., Supervising Athletic Trainer/Lecturer  
Sharon King, M.S., Lecturer/Coach  
Daryl Lee, M.S., Lecturer/Coach  
Bill Maze, M.B.A., Lecturer/Coach  
Maryclaire Robinson, M.S., Lecturer/Coach  
Dwayne Schaffer, M.A., Lecturer/Coach  
Lisa Varnum, B.S., Athletic Trainer/Lecturer  
Robert A. Williams, M.A., Lecturer/Coach

## The Major Program

The mission of the Department of Exercise Science is the integrative study of human biology in the context of physical activity.

**The Program.** The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is primarily for those students who desire a liberal arts program with a broadly based lower division curriculum. This program permits specialization in either the biological or psychological aspects of exercise science, and is most appropriate for those who intend to pursue careers in coaching, teaching, or in community/corporate exercise programs, and for those intending

graduate study in the behavioral aspects of sport and exercise.

The Bachelor of Science program is for students who desire a more intense curriculum in the natural sciences. It involves more extensive lower division preparation in physical and life sciences and requires additional upper division course work more specific to either biomechanics or exercise physiology.

**Preparatory Requirements.** Before declaring a major in Exercise Science, students must complete the following courses with a combined grade point average of at least 2.5 at the University of California (at least 3.0 for similar courses taken at community college). All courses must be taken for a letter grade.

|                             |           |
|-----------------------------|-----------|
| Chemistry 2A, 2B.....       | 10 units  |
| Biological Sciences 1A..... | 5 units   |
| Physics 1A or 7A.....       | 3-4 units |

**Career Alternatives.** This degree program provides preparation for graduate study in exercise and sport science, for careers in the allied health sciences, and for professional schools in medicine, physical therapy, and podiatry.

## A.B. Major Requirements:

|                                             |              |
|---------------------------------------------|--------------|
|                                             | UNITS        |
| <b>Preparatory Subject Matter.....</b>      | <b>34-35</b> |
| Biological Sciences 1A-1B.....              | 10           |
| Chemistry 2A, 2B.....                       | 10           |
| Exercise Science 45.....                    | 3            |
| Physics 1A or 7A.....                       | 3-4          |
| Psychology 1.....                           | 4            |
| Additional requirements.....                | 4            |
| <i>Biological</i> emphasis—Statistics 13    |              |
| <i>Psychological</i> emphasis—Psychology 41 |              |

### Depth Subject Matter.....44

|                                                                                                     |    |
|-----------------------------------------------------------------------------------------------------|----|
| Cell Biology and Human Anatomy 101, 101L.....                                                       | 7  |
| Exercise Science 101, 101L, 102, 103, 104, 105.....                                                 | 16 |
| Neurobiology, Physiology and Behavior 101.....                                                      | 5  |
| Minimum of 12 upper division units in exercise science chosen with approval by a major adviser..... | 12 |
| <i>Biological</i> emphasis:                                                                         |    |

Students electing this emphasis must select a minimum of 9 units from Exercise Science 110, 111, 112, 113, 115, 116, 117, or 118.

*Psychological* emphasis:

Students electing this emphasis must select a minimum of 7 units from Exercise Science 120, 121 or 122.

Minimum of 4 upper division non-exercise science units in either the biological or the psychological area selected from the following lists. Substitutes may be made only with the prior written approval of a major adviser.

|                                                                                                                                                     |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <i>Biological</i> emphasis: Anthropology 101, 152 or 153, Biological Sciences 101, Neurobiology, Physiology and Behavior 113, or Nutrition 101..... | 4 |
| <i>Psychological</i> emphasis: Psychology 114, 136, 143, 145, or 160.....                                                                           | 4 |

None of the variable-unit courses or Physical Education 100, 128A, 128B, 143, or 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

### Total Units for the Major.....78-79

## B.S. Major Requirements:

|                                        |              |
|----------------------------------------|--------------|
|                                        | UNITS        |
| <b>Preparatory Subject Matter.....</b> | <b>55-59</b> |
| Anthropology 1.....                    | 4            |
| Biological Sciences 1A-1B.....         | 10           |
| Chemistry 2A-2B or 2AH-2BH.....        | 10           |
| Mathematics 16A-16B or 21A-21B.....    | 6-8          |
| Exercise Science 45.....               | 3            |

|                             |   |
|-----------------------------|---|
| Physics 7A-7B or 9A-9B..... | 8 |
| Psychology 1.....           | 4 |
| Statistics 13 or 102.....   | 4 |

### Additional Requirements

*Biomechanics* emphasis: Computer Science Engineering 10 or 30 or Engineering 5, and Physics 7C or 9C.....7-8  
*Exercise Physiology* emphasis: Chemistry 8A-8B, or 118A-118B.....6-8

### Depth Subject Matter.....52

|                                                      |    |
|------------------------------------------------------|----|
| Cell Biology and Human Anatomy 101, 101L.....        | 7  |
| Exercise Science 101, 101L, 102, 103, 104, 105.....  | 16 |
| Neurobiology, Physiology and Behavior 101, 101L..... | 7  |
| Restricted electives.....                            | 22 |

(1) Minimum of 10 upper division units from outside the major selected with adviser's approval and as restricted below.

*Biomechanics* emphasis: at least 3 of the 10 units must be selected from the following: Engineering 102, Neurobiology, Physiology and Behavior 112, Evolution and Ecology 170, 170L.

*Exercise Physiology* emphasis: at least 6 of the 10 units must be selected from the following: Biological Sciences 102 or Nutrition 101; Neurobiology, Physiology and Behavior 112, 113, 140.

(2) Minimum of 12 upper division units of Exercise Science courses, including *Biomechanics* emphasis: Exercise Science 113, 115, 126.

*Exercise Physiology* emphasis: at least 9 of the 12 units must be selected from Exercise Science 110, 111, 112, 113, 116, 117, 118.

None of the variable-unit courses or Physical Education 100, 128A, 128B, 143, or 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

### Total Units for the Major.....107-111

**Major Advisers.** W.C. Adams, E.M. Bernauer, D. Hawkins, R.G. Holly, P.A. Molé, P.B. Salitsky, K.R. Williams.

**Teaching Major.** The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

## Minor Program Requirements:

|                              |           |
|------------------------------|-----------|
|                              | UNITS     |
| <b>Exercise Science.....</b> | <b>18</b> |

At least 18 upper division units in exercise science from one of three options.....18

### (a) *Biomechanics*

1) Exercise Science 103 and one course from 101, 102, 104, 105.  
2) Minimum of two courses from Exercise Science 113, 115, 126.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

### (b) *Exercise Physiology*

1) Exercise Science 101 and 101L, and one course from 102, 103, 104, 105.  
2) Minimum of three courses from Exercise Science 110, 111, 112, 113, 116, 117, 118.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L

\*Course not offered this academic year.

may be used to fulfill these requirements. Consult your adviser regularly.

(c) *Psychological Aspects*

1) Exercise Science 105, and one course from 101, 102, 103, 104.

2) Minimum of two courses from Exercise Science 120, 121, 122.

3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Physical Education 100, 128A, 128B, 143, 144, or Exercise Science 146, 146L, 147L, 148, 148L or 149L may be used to fulfill these requirements. Consult your adviser regularly.

**Minor Advisers.** Same as major advisers.

**Honors Program.** Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an adviser. A senior project must be completed, for which up to 10 units (minimum of 6 units) of Exercise Science 199 (split over two quarters) may be earned. These units are taken in addition to the major requirements, and it should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.

**Teaching Credential Subject Representative.** S. Williams. See also the section on the Teacher Education Program.

**Graduate Study.** A program of study and research leading to the M.S. degree is available in exercise science. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Exercise Science. See also the Graduate Studies chapter of this catalog. *Admission to study for the M.A. degree in Physical Education is closed for the 1997-98 academic year.*

**Graduate Adviser.** P.A. Molé.

**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, showers, towels, lockers, tennis courts, and athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. 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 department.

## Physical Education Program

The physical education program provides courses of interest to non-majors. The program focuses on physical activities and education, fitness and health, and recreation. The basic activities series includes Physical Education 1, beginning sports skills and knowledge, Physical Education 6, for students participating in intercollegiate athletics, and Physical Education 7, for students interested in a career in teaching/coaching in grades K-12.

Additional lower division courses include those in special skill areas, such as life-saving and water safety, scuba diving, and health and fitness. Upper division courses include advanced skills in scuba diving and a series of courses that meet the mandated requirements for students pursuing teacher preparation and certification.

The Physical Education program is independent of the degree programs, but is available as part of a student's general educational experience to enhance and broaden the understanding of physical activity in the maintenance of lifetime health and fitness.

## Courses in Exercise Science (EXS)

(Formerly courses in Physical Education)

### Lower Division Courses

#### 45. Foundations of Physical Education and Exercise Science (3) I. Adams

Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological and socio-

logical foundations of physical education and exercise science. Not open for credit to students who have taken Physical Education 45.

#### 90X. Lower Division Seminar (1-2) I, II, III.

The Staff (Chairperson in charge)

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 Science in a small class setting. Not open for credit to students who have taken Physical Education 90X.

#### 92. Exercise Science Internship (1-5) I, II, III.

The Staff (Chairperson in charge)

Internship—3-15 hours. Prerequisite: 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 credit once but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

#### 97T. Tutoring in Exercise Science (1-5) I, II, III.

The Staff (Chairperson in charge)

Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in exercise science course-related projects. Regular meetings with instructor in charge and written report required. May be repeated for credit. (P/NP grading only.)

#### 97TC. Tutoring Exercise Science in the Community (1-5) I, II, III.

The Staff (Chairperson in charge)

Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring in the community in exercise science related projects under the guidance of the Exercise Science faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 101. Physiological Regulation During Exercise (3) I. Molé

Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101. Review of physiological mechanisms underlying acute exercise response. Focus is on physiological regulation and control in response to metabolic demand. Metabolism, fluid composition, acid-base, and temperature regulation are studied in relation to control by the cardiovascular, respiratory, and renal systems. Not open for credit to students who have taken Physical Education 101. GE credit: SciEng.

#### 101L. Exercise Physiology Laboratory (1) I.

Bernaier

Laboratory—3 hours (for 5 weeks); discussion—2.5 hours (for 5 weeks). Prerequisite: course 101 (may be taken concurrently), Neurobiology, Physiology and Behavior 101. Series of laboratory experiments demonstrating the principles of physiological regulation to standardized exercise regimens. The assessment of physiological, environmental and anthropological factors limiting exercise capacities performed on quantitatively controlled ergometric devices, while monitoring physiological variables by noninvasive methods. Not open for credit to students who have taken Physical Education 101L.

#### 102. Physiological Adaptations to Exercise (2) II. Adams in charge

Lecture—2 hours. Prerequisite: course 101 or consent of instructor. Study of physiological capacities with reference to genotypic and adaptive aspects. Analysis of physiological adaptations to chronic physical activity and selected environmental stressors. Not

open for credit to students who have taken Physical Education 102.

#### 103. Analysis of Human Movement (4) III.

K. Williams, Hawkins

Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: Cell Biology and Human Anatomy 101 and Physics 1A; Physics 7A recommended. Anatomical and mechanical fundamentals of human motion. Qualitative and quantitative application of kinesiological principles to a variety of movement situations. Not open for credit to students who have taken Physical Education 103. GE credit: SciEng.

#### 104. Introduction to Motor Control and Skill Acquisition (3) I. Salitsky

Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neurophysiological and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are covered. Not open for credit to students who have taken Physical Education 104.

#### 105. Psychosocial Factors in Motor Performance (3) II. Salitsky

Lecture—3 hours. Prerequisite: Psychology 1. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including gender differences, success and failure, expectations, anxiety, competition, and aggression. Not open for credit to students who have taken Physical Education 105. GE credit: SocSci.

#### 110. Exercise Metabolism (3) II. Molé

Lecture—2 hours; laboratory—five 4-hour sessions. Prerequisite: courses 101, 102; Chemistry 2A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations which affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise. Not open for credit to students who have taken Physical Education 110. GE credit: SciEng, Wrt.

#### 111. Environmental Effects on Physical Performance (3) III. Adams in charge

Lecture—2 hours; laboratory—3 hours, with discussion—1 hour (alternate weeks). Prerequisite: courses 101 and 102, 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. Not open for credit to students who have taken Physical Education 111.

#### 112. Clinical Exercise Physiology (4) III. Holly

Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning are examined in detail. Not open for credit to students who have taken Physical Education 112.

#### 113. Growth and Development in Human Performance (3) II. Adams, Molé

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. Not open for credit to students who have taken Physical Education 113. GE credit: SciEng.

#### 115. Biomechanical Bases of Movement (3) I.

K. Williams

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. Not open for credit to students who have taken Physical Education 115. GE credit: SciEng.

**116. Nutrition for Physically Active Persons (3) III.** Molé

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. Not open for credit to students who have taken Physical Education 116.

**117. Exercise and Aging in Health and Disease (3) II.** Holly

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) 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. Not open for credit to students who have taken Physical Education 117. GE credit: SciEng.

**118. Biomechanics of Work: Physical Performance and Standards in the Workplace (3) III.** Bernauer

Lecture—2 hours; discussion—1 hour. Explores principles and practices of physical performance in the workplace. Established assessment procedures including validation of job standards are presented. Cost of medical benefits are examined with respect to on-site and off-site programs of fitness maintenance and remediation. Not open for credit to students who have taken Physical Education 118. GE credit: Sci-Eng, Wrt.

**120. Sports in American Society (4) I, III.** Salitsky

Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, sexism, racism, and education; current trends and problems. Not open for credit to students who have taken Physical Education 120. GE credit: SocSci, Div.

**121. Sport Psychology (4) III.** Salitsky

Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and field data. Not open for credit to students who have taken Physical Education 121.

**122. Psychological Effects of Physical Activity (3) II.** Salitsky

Lecture—3 hours. Prerequisite: Psychology 1 or 15, and 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). Not open for credit to students who have taken Physical Education 122.

**125. Neuromuscular and Behavioral Aspects of Motor Control (3) II.** Hawkins

Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. 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. Not open for credit to students who have taken Physical Education 125.

**126. Tissue Mechanics (3) II.** Hawkins

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, liga-

ments, tendons, nerves, and skeletal muscle. (Same course as Biomedical Engineering 126.) Not open for credit to students who have taken Physical Education 126. GE credit: SciEng.

**131. The Teaching of Physical Activity to Special Populations (4) I, J.** Vochatzer

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103. The diverse and complex nature of the atypical individual, their disabilities, what caused those disabilities, how they adapt to their disability in daily living, and how physical activity/recreational programs play a role in their daily living. Not open for credit to students who have taken Physical Education 131.

**133. Prevention and Care of Sports Injuries (3) II.** The Staff (Chairperson in charge)

Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Cell Biology and Human Anatomy 101 (may be taken concurrently). Management of the 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 taken Physical Education 133.

**135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3) III.** The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 133, Cell Biology and Human Anatomy 101, and consent of instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. In-depth study of selected current topics in athletic training. Not open for credit to students who have taken Physical Education 135.

**\*146. Theory and Practice of Exercise Training (1) I, II, III.** The Staff

Lecture/discussion—1 hour. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programming and behavioral techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. Not open for credit to students who have taken Physical Education 146. (P/NP grading only.)

**\*146L. Shape-Up Testing and Training Laboratory (1) I, II, III.** The Staff

Laboratory—3 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve leading shape-up class, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (Former course 146L.) (P/NP grading only.)

**\*147L. Adult Fitness Training Laboratory (1) I, II, III.** The Staff

Laboratory—3 hours. Prerequisite: courses 146, 146L, and 102 (may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, and assisting with physiological testing sessions. Not open for credit to students who have taken Physical Education 147L. (P/NP grading only.)

**148. Theory and Practice of Exercise Testing (1) I, II, III.** Holly

Lecture/discussion—1 hour. Prerequisite: courses 101, 102, 112 (may be taken concurrently), and 146; current CPR. 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. Not open for credit to students who have taken Physical Education 148. (P/NP grading only.)

**148L. Adult Fitness Testing Laboratory (1) I, II, III.** Holly

Laboratory—3 hours. Prerequisite: courses 146, 148 (concurrently); current CPR. 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. (Former course Physical Education 148L.) (P/NP grading only.)

**149L. Cardiopulmonary Rehabilitation Laboratory (1) I, II, III.** Holly

Laboratory—3 hours. Prerequisite: courses 148 and 148L; current CPR certification. Testing and training of cardiac patients or individuals at high risk of developing heart disease. Present mini-lectures to program participants, maintain patient records, and present patients' cases in rounds. Two quarters minimum; third quarter permitted. (Former course Physical Education 149L.) (P/NP grading only.)

**192. Exercise Science Internship (1-12) I, II, III.** The Staff (Chairperson in charge)

Internship—3-36 hours. 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 credit for total of 12 units (including course 92), but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

**197T. Tutoring in Exercise Science (1-5) I, II, III.** The Staff (Chairperson in charge)

Tutorial—2-15 hours. Prerequisite: upper division standing and consent of chairperson. Tutoring of students in exercise science course-related projects. Regular meetings with instructor in charge and written report required. May be repeated for credit. (P/NP grading only.)

**197TC. Tutoring Exercise Science in the Community (1-5) I, II, III.** The Staff (Chairperson in charge)

Tutorial—2-15 hours; discussion—1 hour. Prerequisite: upper division standing and consent of chairperson. Tutoring in the community in exercise science related projects under the guidance of the Exercise Science faculty. Regular meetings with instructor in charge and written report required. May be repeated once for credit. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of Department Chairperson. (P/NP grading only.)

**Graduate Courses**

**200A. Introduction to Research: History and Philosophy in Physical Education (2) I.** Molé

Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and their application to current research in human performance; benchmark studies in the evolution of the field. Not open for credit to students who have taken Physical Education 200A.

**200B. Problem Solving and Research Design in Physical Education (2) III.** Molé/Salitsky

Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving; processes in research design and analysis; written and oral presentation of a thesis proposal. Not open for credit to students who have taken Physical Education 200B.

**\*201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I.** Bernauer

Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. Not open for credit to students who have taken Physical Education 201A.

**220. Research Topics in Biomechanics (3) III.**

K. Williams

Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing and consent of instructor; course 115 recommended. Survey of current research into diverse areas of the biomechanics of human movement. Topics will include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, clinical biomechanics. (Same course as Biomechanical Engineering 220.) Not open for credit to students who have taken Physical Education 220.

**221. Anthropometry in Physical Activity (3) III.**

Adams

Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: courses 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. Offered in alternate years. Not open for credit to students who have taken Physical Education 221.

**222. Metabolic Functions in Exercise (4) III.**

Molé

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 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. Not open for credit to students who have taken Physical Education 222.

**223. Physiological Basis of Physical Fitness (2) II.**

Bernauer

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical training and adaptation. Offered in alternate years. Not open for credit to students who have taken Physical Education 223.

**224. Exercise Electrocardiography (2) I.**

Holly

Lecture—2 hours. Prerequisite: course 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. Offered in alternate years. Not open for credit to students who have taken Physical Education 224.

**\*225. Seminar in Cardiac Rehabilitation (2) I.**

Holly

Seminar—2 hours. Prerequisite: course 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. Offered in alternate years. Not open for credit to students who have taken Physical Education 225.

**226. Measurement of the Biological Aspects of Human Performance (3) I.**

Adams in charge

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101; consent of instructor. Introduction to primary measurement strategies used to investigate the biological bases of human performance. Emphasis placed on the critical selection of the most valid tests and on obtaining the most accurate and reliable results. Not open for credit to students who have taken Physical Education 226.

**227. Research Techniques in Biomechanics (4) II.**

K. Williams

Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor, Mathematics 22B; course 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. Not open for credit to students who have taken Physical Education 227. (Same course as Biomedical Engineering 227/Mechanical Engineering 227.)

**228. Skeletal Muscle Mechanics: Form, Function, Adaptability (4) III.**

Hawkins

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.) Not open for credit to students who have taken Physical Education 228.

**\*230. Human Performance: Psychological Aspects (3) II.**

Salitsky

Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport. Not open for credit to students who have taken Physical Education 230.

**\*232. Health Psychology: Effects of Physical Activity (3) I.**

Salitsky

Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health. Not open for credit to students who have taken Physical Education 232.

**290. Seminar in Exercise Science (1) II.**

Hawkins

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.)

**298. Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge)

Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.**

The Staff (Chairperson in charge)

Prerequisite: graduate standing; consent of instructor and Department Chairperson. (S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum (1-4) I, II, III.**

The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Courses in Physical Education (PHE)****Lower Division Courses****1. Physical Activities (0.5) I, II, III.**

The Staff (Chairperson in charge)

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.)

**\*2. Principles of Basic Exercise Conditioning (2) I.**

(Swimley in charge)

Lecture—1 hour; laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimens, e.g., theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, and limitations of environment, age, and gender on fitness levels. (P/NP grading only.)

**6. Preparation and Participation in ICA****Competition (1) I, II, III.** The Staff (Chairperson in charge)

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.)

**7. Professional Physical Education Activities:****Men and Women (1) I, II, III.** The Staff

(Chairperson in charge)

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.

**\*15. Administration of Intramural Sports (2) I.**

Colberg

Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

**25. Theory of Lifesaving and Water Safety (2) I,**

II, III.

Jahn

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.)

**27. Training Course for Water Safety**

Instructors (2) III.

Jahn

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.)

**29. Basic Scuba (2) I, III.**

Fastenau

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.)

**40. Drugs and Society (2) I, III.**

D. Vochatzer

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.)

**44. Principles of Healthful Living (2) III.**

Gill-Fisher in charge

Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)

**92. Physical Education Internship (1-5) I, II, III.**

The Staff (Chairperson in charge)

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 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 credit once but no internship units will be counted toward Exercise Science major. (P/NP grading only.)

**97T. Tutoring in Physical Education** (1-5) I, II, III. The Staff (Chairperson in charge)  
Tutorial—1-5 hours. Prerequisite: lower division standing and consent of Department Chairperson. 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 once for credit. (P/NP grading only.)

**97TC. Tutoring in the Community** (1-5) I, II, III. The Staff (Chairperson in charge)  
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Department Chairperson. 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 once for credit. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

### Upper Division Courses

**100. Field Experience in Teaching Physical Education** (2) I, II, III. The Staff (Chairperson in charge)  
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 once for credit. (P/NP grading only.)

**128A. Intermediate Scuba Diving** (4) II. Fastenau  
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.)

**128B. Research Diving Techniques** (4) III. Fastenau  
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.)

**\*132. First Aid Leadership and Accident Management** (3) I, II, III. The Staff (Chairperson in charge)  
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. The study and practice of first aid leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

**142. Physical Education in the Public Schools** (3) I. S. Williams  
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

**143. Coaching Effectiveness** (3) II. Bronzan, King  
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.)

**\*144. Principles of Health Education** (2) II. The Staff (Chairperson in charge)  
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.)

**\*145. Administration of Health/Fitness Programs** (2) III. The Staff (Chairperson in charge)  
Lecture—2 hours. Principles of organizing and directing health/fitness programs. Includes selection and training of personnel, methods of evaluating personnel and programs, and elements of planning.

**150. Recreation in the Community** (3) III. Jahn  
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) I, II, III. The Staff (Chairperson in charge)  
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.)

**197T. Tutoring in Physical Education** (1-5) I, II, III. The Staff (Chairperson in charge)  
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 once for credit. (P/NP grading only.)

**197TC. Tutoring in the Community** (1-5) I, II, III. The Staff (Chairperson in charge)  
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 once for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Professional Courses

**300. The Elementary Physical Education Program** (2) III. Goldbar  
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.

**380. Methods of Teaching Physical Education** (3) III. S. Williams  
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.)

## Family and Community Medicine

See Medicine, School of

## Feminist Theory and Research

Suad Joseph, Ph.D., Program Director  
Program Office, 2201 Hart Hall (530-752-4686)  
World Wide Web:

<http://cougar.ucdavis.edu/wms/deprogram.html>

**Graduate Study.** The program in Women's Studies offers courses leading to a *designated emphasis* in Feminist Theory and Research. The courses provide theoretical and interdisciplinary perspectives to students already preparing for the Ph.D. in one of 12 participating departments (Anthropology, Comparative Literature, Dramatic Art, Education, English, French, German, History, Italian, Psychology, Spanish, and Sociology). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (Women's Studies 200A and 200B) and two courses on gender, one of which must be in the student's home department. It is expected that an analysis of gender will be a central component of the student's doctoral examination and dissertation.

**Graduate Adviser.** Consult the Women's Studies office (530-752-4686).

## Fermentation Science

(College of Agricultural and Environmental Sciences)

### The Major Program

The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad, interdisciplinary food-related education is offered that may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations and waste treatments in the production of microbial cells, drugs, enzymes, hormones, solvents, acids, and vitamins are further opportunities for study.

**The Program.** The major in fermentation science leads to a Bachelor of Science degree. Most of the instruction for the major is done in the Department of Viticulture and Enology and in the Department of Food Science and Technology. Students also take courses in chemistry, microbiology, molecular and cellular biology, genetics, and computer science. Electives often include additional courses in sensory science, management and viticulture.

**Career Alternatives.** Graduates qualify for supervisory, technical, production, product development, quality control, research, sales, or executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies. Students who choose to continue in graduate study have done so in such areas as food science-enology, microbiology, agricultural chemistry, and biochemistry.

### B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

|                                              |              |
|----------------------------------------------|--------------|
| <b>English Composition Requirement</b> ..... | <b>0-8</b>   |
| See College requirement                      |              |
| <b>Preparatory Subject Matter</b> .....      | <b>59-66</b> |
| Biochemistry (Biological Sciences 102, 103)  |              |
| .....                                        | 6            |
| Biology (Biological Sciences 1A) .....       | 5            |



|                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Chemistry (Chemistry 2A-2B-2C; and 8A-8B or 128A-128B, 129A) .....                                                                                                                                                                                                                                                                                                                                                                        | 21-25        |
| Computer science (Agricultural Systems and Environment 21) .....                                                                                                                                                                                                                                                                                                                                                                          | 3            |
| Mathematics (Mathematics 16A-16B or 21A-21B) .....                                                                                                                                                                                                                                                                                                                                                                                        | 6-8          |
| Microbiology (Microbiology 102-102L) .....                                                                                                                                                                                                                                                                                                                                                                                                | 6            |
| Physics (Physics 7A and 7B) .....                                                                                                                                                                                                                                                                                                                                                                                                         | 8            |
| Statistics, including analysis of variance (Agricultural Systems and Environment 120 or Statistics 106) .....                                                                                                                                                                                                                                                                                                                             | 4            |
| <b>Breadth/General Education</b> .....                                                                                                                                                                                                                                                                                                                                                                                                    | <b>0-24</b>  |
| See General Education requirement                                                                                                                                                                                                                                                                                                                                                                                                         |              |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                         | <b>40</b>    |
| (Courses in depth subject matter may not be taken on the P/NP grading basis. Overall GPA in depth subject matter must be 2.0 or greater.)                                                                                                                                                                                                                                                                                                 |              |
| Choose from Biological Sciences 101; Chemical Engineering 161A, 206; Chemistry 107A, 107B, 108, 130; Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, 123, 123L, 128, 150, 205, 250, 250L; Microbiology 105, 140, 150, 155L, 250; Viticulture and Enology 3, 123, 124, 125, 126, 127, 128, 129, 135, 140, 186, 190X, 219, 225, 235 (no variable-unit 190, 192, 199, 299 courses allowed toward depth requirement) |              |
| <b>Restricted Electives</b> .....                                                                                                                                                                                                                                                                                                                                                                                                         | <b>28</b>    |
| Selected according to student's educational goals and upon approval by adviser. Only 6 units of 192 or 6 units of 190, 198, 199, 290, or 298 may be counted; or a total of 8 units of these courses combined. A list of approved courses is available from advisers.                                                                                                                                                                      |              |
| <b>Unrestricted Electives</b> .....                                                                                                                                                                                                                                                                                                                                                                                                       | <b>14-23</b> |
| <b>Total Units for the Degree</b> .....                                                                                                                                                                                                                                                                                                                                                                                                   | <b>180</b>   |

**Major Adviser.** A. Waterhouse.

**Graduate Study.** Refer to the Graduate Studies degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, Microbiology.

## Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Textiles and Clothing.

### 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, absorbent 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:

(For convenience in program planning, the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

|                                                                                                                                                     |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                     | UNITS        |
| <b>English Composition Requirement</b> .....                                                                                                        | <b>7-12</b>  |
| See College requirement .....                                                                                                                       | 0-8          |
| Communication 1 .....                                                                                                                               | 4            |
| Additional English (English 104) .....                                                                                                              | 3            |
| <b>Preparatory Subject Matter</b> .....                                                                                                             | <b>52-55</b> |
| Chemistry (Chemistry 2A-2B-2C) .....                                                                                                                | 15           |
| Computer science (Computer Science Engineering 15 or 30) .....                                                                                      | 4            |
| Mathematics (Mathematics 16A, 16B, 16C or 21A, 21B, 21C) .....                                                                                      | 9-12         |
| Physics (Physics 5A, 5B, 5C or 9A, 9B, 9C) .....                                                                                                    | 12           |
| Statistics (Statistics 13 or Agricultural Systems and Environment 120) .....                                                                        | 4            |
| Textiles and clothing (Textiles and Clothing 6 and 8 or Engineering 45) .....                                                                       | 8            |
| <b>Breadth/General Education</b> .....                                                                                                              | <b>6-24</b>  |
| Satisfaction of General Education requirement; See advising office for breadth requirement.                                                         |              |
| <b>Depth Subject Matter</b> .....                                                                                                                   | <b>37</b>    |
| Textiles Science: Textiles and Clothing 163, 163L, 180A, 180B, .....                                                                                | 8            |
| Fiber and Polymer Science 100, 150, 161, 161L .....                                                                                                 | 10           |
| Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B) .....                                                            | 19           |
| <b>Restricted Electives</b> .....                                                                                                                   | <b>30</b>    |
| Selected courses from the following:                                                                                                                |              |
| <i>Computer Science and Mathematics:</i>                                                                                                            |              |
| Agricultural Systems and Environment 21; Engineering 5; Applied Science Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B |              |
| <i>Chemistry:</i>                                                                                                                                   |              |
| Chemistry 108, 111, 115, 120, 121, 124A, 124B, 124C, 130, 131, 140                                                                                  |              |
| <i>Marketing/Management:</i>                                                                                                                        |              |
| Agricultural and Resource Economics 100A, 100B, 113, 136, 157, Economics 1A, 1B, Statistics 103                                                     |              |
| <i>Material and Advanced Fiber/Polymer Science:</i>                                                                                                 |              |
| Aeronautical Science Engineering 137, Engineering 104A, 104B, Textiles and Clothing 250A-F, 290, 293                                                |              |
| <i>Textiles:</i>                                                                                                                                    |              |
| Textiles and Clothing 162, 162L, 164, 165, 173, 174                                                                                                 |              |
| <b>Unrestricted Electives</b> .....                                                                                                                 | <b>23-40</b> |
| <b>Total Units for the Degree</b> .....                                                                                                             | <b>180</b>   |

**Major Adviser.** Y.-L. Hsieh (*Textiles and Clothing*).

**Advising Center** for the major is located in 129 Everson Hall (530-752-4417).

### Minor Program Requirements:

|                                                                                                              |           |
|--------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                              | UNITS     |
| <b>Fiber and Polymer Science</b> .....                                                                       | <b>18</b> |
| Textiles and Clothing 6 or Engineering 45 ...4                                                               |           |
| Courses selected from the following:                                                                         |           |
| Fiber and Polymer Science 100, 150, 161, 161L; and Textiles and Clothing 163 and 163L or 180A and 180B ..... | 14        |

**Minor Adviser.** Y.-L. Hsieh.

## Courses in Fiber and Polymer Science (FPS)

### Upper Division Courses

#### 100. Principles of Polymer Materials Science (3) II. Pan

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.)

#### 110. Plastics in Society and the Environment (4) III. The Staff

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) III. Hsieh

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.

#### \*161. Structure and Properties of Fibers (3) I. Hsieh

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. Offered in alternate years.

#### \*161L. Textile Chemical Analysis Laboratory (1) I. Hsieh

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. Offered in alternate years.

### Professional Course

#### 396. Teaching Assistant Training Practicum

(1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Film Studies

(College of Letters and Science)

The interdisciplinary minor in Film Studies provides insight into and critical perspectives on the role of film in culture. The minor emphasizes connections between visual media and other forms of representation, and between Film Studies and other academic disciplines. Students will gain an understanding of the history of film, an awareness of genres, national traditions, and representational conventions, and an ability to "read" films aesthetically, culturally, ideologically, and historically. The minor is sponsored by the Humanities Program.

### Minor Program Requirements:

|                                                                                                                    |           |
|--------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                    | UNITS     |
| <b>Film Studies</b> .....                                                                                          | <b>24</b> |
| Humanities 10 .....                                                                                                | 4         |
| Upper division courses selected from the following list, with no more than two courses from any one category ..... | 20        |
| (a) <i>Problems and Themes in Cinema:</i>                                                                          |           |
| Anthropology 136, Classics 102, Dra-                                                                               |           |

matic Art 115, English 160, 162, Humanities 124, 125, Women's Studies 162

(b) *Cinema, Nation and Nationality:* German 119, 142C, Italian 150, Japanese 106, Russian 129, Spanish 148

(c) *Film and Social Identities:* African American and African Studies 170, 171, Humanities 120, 122, Women's Studies 160, 164

(d) *Film/Video Production:* Art Studio 115, 116, 117

(e) *Popular and Visual Culture:* American Studies 130, 133, 139, Art Studio 150, Communication 140, 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 adviser'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.

**Advising.** Humanities Program, 530-752-9934.

## Fisheries

See **Animal Science; Biologica and Agricultural Engineering; and Wildlife, Fish and Conservation Biology**

## Food Biochemistry

(College of Agricultural and Environmental Sciences)

### The Major Program

The major in food biochemistry stresses the principles of chemistry and biochemistry as related to constituents of foods and the changes which occur in the constituents before and during processing and during storage. Particular emphasis is placed on the role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods.

**The Program.** The food biochemistry curriculum stresses a strong background in chemistry, physics, mathematics, and biology at the lower division level. At the upper division level, students take specialized courses in food science and technology and advanced biochemistry and nutrition. Through the appropriate choice of electives, students may emphasize certain research areas such as nutrition, food processing, or toxicology.

**Career Alternatives.** The main employment options for a food biochemistry graduate are in research and development at large food industry units; in laboratory-related employment in quality assurance, new food technology, and food analysis; or in any position requiring knowledge of biochemical techniques, such as in clinical laboratories. The major offers excellent preparation for graduate study in areas such as food science, nutrition, biochemistry, and environmental toxicology. Food biochemistry has also been chosen as a pre-professional major by students interested in medical, veterinary, optometry, pharmacy, or dental school.

### B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

**English Composition Requirement** .....0-8  
See College English requirement

**Preparatory Subject Matter** .....77-79  
Biochemistry (Biological Sciences 102, 103)

.....6

Biology (Biological Sciences 1A-1B-1C).....15

Chemistry (Chemistry 2A-2B-2C or 2AH-2BH-

2CH; 118A-118B-118C or 128A-128B-

128C, 129A; 107A-107B or 110A-110B)

.....32-33

Mathematics, (Mathematics 16A-16B-16C or

21A-21B-21C) .....9

Physics (Physics 7A-7B-7C or 9A-9B-9C).....12

Other (one course from Computer Science

Engineering 10, 30, Engineering 5, Math-

ematics 22A, 22B, 22C, Statistics 13,

Agricultural Systems and Environment

120) .....3-4

**Breadth/General Education** .....24

Satisfaction of General Education require-

ment.

**Depth Subject Matter** .....30

Food Science and Technology (to include

Food Science and Technology 103, 104,

104L, 110A).....9

Biochemistry (Food Science and Technology

123, 123L).....5

**Restricted Electives** .....24

At least one additional upper division bio-

chemistry course, other than Molecular

and Cellular Biology 120L. One upper

division Microbiology course. One nutri-

tion course other than Nutrition 10.

Remaining courses can be selected from

biochemistry, physiology, environmental

toxicology, genetics, public health, micro-

biology or other subjects related to Food

Science .....24

**Unrestricted Electives** .....15-25

**Total Units for the Degree**.....180

**Major Adviser.** G.M. Smith (*Food Science and Technology*).

**Graduate Study.** Refer to the Graduate Studies chapter of this catalog.

## 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, food engineering, and may choose to specialize in one of five career-oriented options. 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:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses may be taken with adviser's approval. *Courses shown without parentheses are required for all options.*)

UNITS

**English Composition Requirement** .....4-8

See College requirement (one course of which

must be English 102 with food science or

related area, or English 104).....4-8

**Preparatory Subject Matter** .....53-59

Calculus (Mathematics 16A-16B-16C).....9

Biology (Biological Sciences 1A, 1C) .....15

General chemistry (Chemistry 2A-2B-2C).....10

Organic chemistry (see option for require-

ment)

Physics (Physics 7A-7B-7C) .....12

Food science and society (Food Science and

Technology 1 and or 2; both recom-

mended, but not required) .....(3-6)

Introduction to food science and technology

(Food Science and Technology 50).....(3)

Nutrition (Nutrition 10 or approved substitute)

.....3

**Breadth/General Education** .....24

Satisfaction of General Education require-

ment plus social science and humanities

electives to total 24 units

**Depth Subject Matter** .....49-50

General biochemistry (Biological Sciences

102-103).....6

Statistics (Agricultural Systems and Environ-

ment 120) .....4

Food composition and laboratory, Food Sci-

ence and Technology 100A, 101A.....5

Food properties, Food Science and Technol-

ogy 100B .....3

Food biochemistry, Food Science and Technol-

ogy 100C .....3

Food analysis, Food Science and Technology

103 .....5

Food microbiology and laboratory, Food Sci-

ence and Technology 104, 104L.....7

Food engineering and laboratory, Food Sci-

ence and Technology 110A-110B,

Applied Biological Systems Technology

110L .....8

Food sensory science, Food Science and

Technology 127 or 107A .....3 or 4

Food product development, Food Science

and Technology 160 .....4

Food science seminar, Food Science and

Technology 190 .....1

**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** .....12

Organic chemistry (Chemistry 8A-8B) .....6

Plant sanitation, Food Science and Technol-

ogy 108 .....3

Quality assurance, Food Science and Technol-

ogy 109 .....3

**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.....25**

|                                                                     |   |
|---------------------------------------------------------------------|---|
| Organic chemistry (Chemistry 8A-8B).....                            | 6 |
| Microeconomics (Economics 1A).....                                  | 5 |
| Business organization, Agricultural and Resource Economics 112..... | 4 |
| Marketing management, Agricultural and Resource Economics 113.....  | 4 |
| Introduction to financial accounting, Management 100.....           | 3 |
| Quality assurance, 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 obtain the requirements for the teaching credential teach elementary or secondary school home economics.

**Specific course requirements.....20**

|                                                                                             |   |
|---------------------------------------------------------------------------------------------|---|
| Organic chemistry (Chemistry 8A-8B).....                                                    | 6 |
| Food properties laboratory, Food Science and Technology 101B.....                           | 2 |
| Food sensory science, Food Science and Technology 107B (107A is required prerequisite)..... | 3 |
| Food product development field trip, Food Science and Technology 47.....                    | 1 |
| Consumer behavior, Consumer Science 100.....                                                | 3 |
| Quality assurance, Food Science and Technology 109.....                                     | 3 |
| New food product ideas, Food Science and Technology 159.....                                | 2 |

**Selected additional courses.....10**

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.....17-23**

|                                                           |      |
|-----------------------------------------------------------|------|
| Biology (Biological Sciences 1B).....                     | 5    |
| Organic chemistry, Chemistry 8A-8B or 118A-118B-118C..... | 6-12 |
| General microbiology, Microbiology 102, 102L.....         | 6    |

**Selected additional courses.....10**

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**

|                                                                         |       |
|-------------------------------------------------------------------------|-------|
| Organic chemistry, Chemistry 118A-118B-118C or 128A-128B-128C-129A..... | 11-12 |
|-------------------------------------------------------------------------|-------|

Chemistry, Chemistry 124A.....3

Physical chemistry (Chemistry 107A-107B).....6

**Selected additional courses.....10**

Select courses from a master list available from the department Advising Center.

**Unrestricted Electives.....4-23****Total Units for the Degree.....180**

**Major Adviser.** E. Bandman (*Food Science and Technology*).

**Advising Center** for the major is located in 111 Cruess Hall.

**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)

David M. Ogrzydziak, Ph.D., Chairperson of the Group

Group Office, 126 Cruess Hall (530-752-1466; Fax: 530-752-4759)

World Wide Web: <http://www-foodsci.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 five areas of specialization: chemistry-biochemistry, microbiology, engineering-technology, sensory science, and enology. 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.

## Food Science and Technology

(College of Agricultural and Environmental Sciences)

Charles F. Shoemaker, Ph.D., Chairperson of the Department

Department Office, 126 Cruess Hall (530-752-1465)

World Wide Web: <http://www-foodsci.ucdavis.edu>

**Faculty**

Everett Bandman, Ph.D., Professor  
Stephanie R. Dungan, Ph.D., Assistant Professor (*Food Science and Technology, Chemical Engineering*)

J. Bruce German, Ph.D., Associate Professor  
Jean-Xavier Guinard, Ph.D., Assistant Professor  
Norman F. Haard, Ph.D., Professor  
Ellen C. Hopmans, Ph.D., Assistant Professor  
T. William Hutchens, Ph.D., Professor  
John M. Krochta, Ph.D., Professor (*Food Science and Technology, Biological and Agricultural Engineering*)

Kathryn L. McCarthy, Ph.D., Associate Professor (*Food Science and Technology, Biological and Agricultural Engineering*)

Michael J. McCarthy, Ph.D., Professor (*Food Science and Technology, Biological and Agricultural Engineering*)

David M. Ogrzydziak, Ph.D., Professor

Michael A. O'Mahony, Ph.D., Professor

Chester W. Price, Ph.D., Professor

David S. Reid, Ph.D., Professor

Gerald F. Russell, Ph.D., Professor

Barbara O. Schneeman, Ph.D., Professor (*Food Science and Technology, Internal Medicine, Nutrition*)

Charles F. Shoemaker, Ph.D., Professor

R. Paul Singh, Ph.D., Professor (*Food Science and Technology, Biological and Agricultural Engineering*)

Gary M. Smith, Ph.D., Professor

**Emeriti Faculty**

Ericka L. Barrett, Ph.D., Professor Emerita

Richard A. Bernhard, Ph.D., Professor Emeritus

Walter L. Dunkley, Ph.D., Professor Emeritus

Robert E. Feeney, Ph.D., Professor Emeritus

Dieter W. Gruenwedel, Ph.D., Professor Emeritus

Jerald M. Henderson, D.Engr., Professor Emeritus

Walter G. Jennings, Ph.D., Professor Emeritus

Michael J. Lewis, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

Bor S. Luh, Ph.D., Professor Emeritus

R. Larry Merson, Ph.D., Professor Emeritus

Martin W. Miller, Ph.D., Professor Emeritus

Herman J. Phaff, Ph.D., Professor Emeritus

Thomas Richardson, Ph.D., Professor Emeritus

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

**Affiliated Faculty**

Diane M. Barrett, Ph.D., Associate Specialist

Christine M. Bruhn, Ph.D., Specialist

John C. Bruhn, Ph.D., Specialist

Linda J. Harris, Ph.D., Assistant Specialist

Robert J. Price, Ph.D., Specialist

Moshe Rosenberg, Ph.D., Associate Specialist

Carl K. Winter, Ph.D., Associate Specialist

**Major Program and Graduate Study.** See the majors in Food Science and Food Biochemistry; and for graduate study, refer to the Graduate Studies chapter of this catalog.

**Related Courses.** See courses in Consumer Science, Engineering, Molecular and Cellular Biology, Nutrition, and Viticulture and Enology; Environmental Toxicology 101, Population Health and Reproduction 150, Plant Biology 172 and 172L.

## Courses in Food Science and Technology (FST)

**Lower Division Courses**

**1. Food Science and Society (3) II.** Bandman  
Lecture—2 hours; discussion—1 hour. Nature and scope of world food problems; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement and evaluation of acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B.

**2. Introductory Food Science (3) I, III.** Russell  
Lecture—3 hours; one industrial visit to a food factory (optional). Processes by which raw agricultural commodities are preserved and converted into edible foods; regulation of food manufacture and the chemistry and microbiology of food that control its qualities and safety. Not open for credit to students who have received credit for any other Food Science and Technology course. GE credit: SciEng or SocSci.

**47. Food Product Development Field Study (1) III.** Shoemaker  
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.)

**50. Introduction to Food Preservation (4) III.** Krochta

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, Biological Sciences 1A. Introduction to fruit, vegetable, cereal, dairy, seafood, and meat commodity groups. Overview of processes used for preservation of food quality. Laboratory exercises include canning, refrigeration, freezing, fermentation and dehydration preservation operations.

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Shoemaker in charge)  
(P/NP grading only.)

**Upper Division Courses**

**100A. Food Chemistry (3) I.** Dungan

Lecture—3 hours. Prerequisite: Chemistry 8B; Biological Sciences 1A recommended. Chemical aspects of food composition. Emphasis given to the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins and water.

**100B. Food Properties (3) II.** The Staff

Lecture—3 hours. Prerequisite: Chemistry 8B, course 100A. Further study of the properties of food with emphasis on the chemical basis of food quality attributes of flavor, texture, color, nutrition, and chemical safety.

**100C. Principles of Food Biochemistry (3) III.**

The Staff

Lecture—3 hours. Prerequisite: course 100B, Biological Sciences 103 (may be taken concurrently). Principles of physiology, cell biology, and biochemistry applied to postharvest changes in edible plant and animal tissues. Importance of enzymes in food quality and their use as food processing aids. Application of recombinant DNA technology to improving food quality.

**101A. Food Chemistry Laboratory (2) I.**

Shoemaker

Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100A (may be taken concurrently). Chemical aspects of food composition described in course 100A.

**101B. Food Properties Laboratory (2) II.**

Shoemaker

Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100B (may be taken concurrently). Study of properties of food described in course 100B.

**102A. Malting and Brewing Science (4) II.**

The Staff

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.

**102B. Practical Malting and Brewing (4) III.**

The Staff

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.

**103. Physical and Chemical Methods for Food Analysis (5) I.** Hopmans

Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 2C, 8B; Biological Sciences 103 (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed.

**104. Food Microbiology (3) II.** C. Price

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.

**104L. Food Microbiology Laboratory (4) II, III.**

The Staff

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.

**107A. Food Sensory Science (4) I.** O'Mahony

Lecture—3 hours; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120 (may be taken concurrently) or consent of instructor. Critical examination of techniques and theories of sensory measurement of food as analytical tools and as measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food.

**107B. Food Sensory Science (3) II.** Guinard

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107A. A critical examination of techniques and theories of sensory measurement applied to a range of food systems. Methods for analyzing the sensory attributes of food in relation to quality assurance, product development and optimization.

**108. Food Processing Plant Sanitation (3) I.**

Ogrydziak

Lecture—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A. Discussion of factors relating to sanitary control of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the pertinence of government control agencies.

**109. Principles of Quality Assurance in Food Processing (3) III.** K. McCarthy

Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Systems and Environment 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.

**110A. Physical Principles in Food Processing (3) I.** M. McCarthy

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.

**110B. Heat and Mass Transfer in Food Processing (3) II.** Singh

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.

**117. Design and Analysis for Sensory Food Science (3) I.** O'Mahony

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Statistics 13 or consent of instructor. Methods of design and analysis for sensory food science. Relative merits and limitations of parametric and nonparametric approaches. Use of human judges. Data analysis and computation. Modifications for quality assurance.

**119. Chemistry and Technology of Milk and Dairy Products (4) III.** The Staff

Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 1A and 102, or consent of instructor. Composition, structure and proper-

ties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products.

**120. Principles of Meat Science (3) III.**

Bandman, Lee (Animal Science)

Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. 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: Sci-Eng.

**120L. Meat Science Laboratory (2) III.** Lee

(Animal Science)

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.)

**\*121. Principles of Poultry Product Technology (3) I.** King (Avian Sciences)

Lecture—3 hours. Prerequisite: Biological Sciences 103 (may be taken concurrently). Quality, preservation, and processing of avian products. Topics include quality control, nutrition, chemistry, biochemistry, microbiology, and functional properties.

**\*122. Marine Food Science (3) II.** Ogrydziak,

Haard

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 103 (may be taken concurrently). Biochemical, microbiological, and ecological principles unique to fish; where fish are found and why; fishing and landing techniques as they influence quality; processing, storage, and public health aspects of marine organisms; resource development, including aquaculture. Offered in alternate years.

**123. Introduction to Enzymology (3) III.** G. Smith

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.)

**123L. Enzymology Laboratory (2) III.** G. Smith

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.)

**127. Introduction to the Sensory Characteristics of Food (3) III.** Guinard

Lecture—2 hours; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120. Critical examination of techniques and theory of sensory measurement of food along with correlations with instrumental measures. For students not intending to specialize in food sensory science.

**128. Food Toxicology (3) III.** Russell, Shibamoto

(Environmental Toxicology)

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.

**131. Food Packaging (3) I.** Krochta

Lecture—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A, Physics 5B or 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. Freezing Preservation of Food** (3) II. Reid  
Lecture—3 hours. Prerequisite: course 110B, Biological Sciences 1A, and Chemistry 8B; course 104 recommended. Freezing of model systems and food with emphasis on physicochemical aspects. Consequences of food freezing and thawing. Modeling of freezing for predictive purposes. Visualization and characterization of frozen materials. Offered in alternate years.

**\*159. New Food Product Ideas** (2) I. Haard  
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) II. The Staff  
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.

**190. Senior Seminar** (1) I. German  
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.

**192. Internship for Advanced Undergraduates** (1-12) I, II, III. The Staff (Shoemaker in charge)  
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) I, II, III.  
The Staff (Shoemaker in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Shoemaker in charge)  
(P/NP grading only.)

## Graduate Courses

**201. Food Chemistry and Biochemistry** (3) I. Shoemaker  
Lecture—3 hours. Prerequisite: Biological Sciences 103. Topics on enzymes, proteins, pigments, lipids, and vitamins. Biochemical principles and methods related to food composition, preservation, and processing. Research proposals and group problem solving.

**202. Chemical and Physical Changes in Food** (4) II. Reid, Dungan  
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.

**203. Food Processing** (3) II. K. McCarthy  
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.

**204. Advanced Food Microbiology** (3) III. The Staff  
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.

**205. Industrial Microbiology** (3) I. Ogrydziak  
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) III. Noble (Viticulture and Enology)  
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) II. G. Smith  
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) I. German  
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.

**217. Advanced Food Sensory Science** (2) I. O'Mahony  
Lecture—2 hours. Prerequisite: course 107A (may be taken concurrently). 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.

**227. Food Perception and the Chemical Senses** (2) II. Guinard  
Lecture—2 hours. Prerequisite: course 107B (may be taken concurrently), 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.

**250. Chromatographic and Electrophoretic Methods** (4) III. Hopmans  
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 2A-2B-2C, 8A-8B, 107A-107B; Biological Sciences 102 and 103 or consent of instructor. Theory and practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems and recovery of purified sample components.

**250L. Chromatographic and Electrophoretic Methods Laboratory** (1) III. Hopmans  
Laboratory—3 hours. Prerequisite: course 250 concurrently. Practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems, and recovery of purified sample components.

**290. Seminar** (1) I, II, III. Dungan, Ogrydziak, Shoemaker  
Seminar—1 hour. May be repeated for credit. (S/U grading only.)

**290C. Advanced Research Conference** (1) I, II, III. The Staff (Shoemaker in charge)  
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.)

**291. Advanced Food Science Seminar** (1) III. Dungan  
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.)

**298. Group Study** (1-5) I, II, III. The Staff (Shoemaker in charge)

**299. Research** (1-12) I, II, III. The Staff (Shoemaker in charge)  
Prerequisite: graduate standing. (S/U grading only.)

## Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

# Food Service Management

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of Nutrition.

**The Major Program and Graduate Study.** Food Service Management is incorporated within the major in Dietetics. 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 Food Science and Technology, and 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, 1202E Meyer Hall (530-752-2512).*

### Upper Division Courses

**120. Principles of Quantity Food Production** (3) III. Prophet  
Lecture—3 hours. Prerequisite: Food Science and Technology 100B and 101B. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

**120L. Quantity Food Production Laboratory** (2) I, II. Prophet  
Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

**122. Food Service Systems Management** (3) II. Prophet  
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.

**192. Internship** (1-12) I, II, III. The Staff  
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.)

**197T. Tutoring in Food Service Management** (1-2) I, II, III. The Staff (Prophet in charge)  
Discussion/laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Ser-

vice 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.)

**198. Directed Group Study (1-5) I, II, III.**

The Staff (Prophet in charge)  
(P/NP grading only.)

**199. Special Study for Advanced**

**Undergraduates (1-5) I, II, III.** The Staff (Prophet in charge)  
(P/NP grading only.)

## French

(College of Letters and Science)

Georges Van Den Abbeele, Ph.D., Chairperson of the Department

Department Office (French and Italian), 522 Sproul Hall (530-752-0830)

World Wide Web: <http://french.ucdavis.edu>

### Faculty

Marc E. Blanchard, Agrégé de Lettres, Professor  
(*French, Comparative Literature*)

Simone Clay, Ph.D., Lecturer

Elizabeth Constable, Ph.D., Assistant Professor  
Manfred Kusch, Ph.D., Senior Lecturer (*French, Comparative Literature*)

Maria I. Manoliu, Ph.D., Professor

Michèle Praeger, Ph.D., Associate Professor

Georges Van Den Abbeele, Ph.D., Professor

Jerome Wagnild, Ph.D., Lecturer

### Emeriti Faculty

Claude Abraham, Ph.D., Professor Emeritus

Max Bach, 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

Marshall Lindsay, Ph.D., Professor Emeritus

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        |
|--------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                        | <b>19-36</b> |
| French 1, 2, 3 (or the equivalent) .....                                                                                       | 0-15         |
| French 20, 21, 22, 23 .....                                                                                                    | 17           |
| Linguistics 1 .....                                                                                                            | 4            |
| <b>Depth Subject Matter</b> .....                                                                                              | <b>44</b>    |
| French 100, 101, 102, 103, 104 .....                                                                                           | 20           |
| Two additional upper division French literature courses .....                                                                  | 8            |
| Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate adviser ..... | 16           |
| <b>Total Units for the Major</b> .....                                                                                         | <b>63-80</b> |

### Recommended

French 101, 102, 103, 104, 107, and 160 plus other upper division courses for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

**Major Adviser.** E. Constable.

## Minor Program Requirements:

|                                                                                                                             | UNITS     |
|-----------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>French</b> .....                                                                                                         | <b>24</b> |
| French 100 .....                                                                                                            | 4         |
| Two courses from French 101, 102 or 103 .....                                                                               | 8         |
| Three elective courses in French language, literature, or civilization one of which must be either French 107N or 108 ..... | 12        |

**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 3.5 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.** J. Wagnild. See also under the Teacher Education Program.

**Graduate Study.** The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in either Critical Theory or Feminist Theory and Research, which are offered by the Program in Critical Theory and The Women's Studies Program, respectively. Detailed information may be obtained from the graduate advisers or the department chairperson.

**Graduate Advisers.** M.I. Manoliu (M.A., Ph.D. degrees—French Linguistics); M. Blanchard (M.A., Ph.D. degrees—French Literature).

**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) I, II, III.** The Staff  
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 stu-

dent's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.

**1G. French for Graduate Students (5) III.**

The Staff (Chairperson in charge)  
Lecture/discussion—5 hours. A course designed to prepare students for the graduate reading examination in French. (P/NP grading only.)

**2. Elementary French (5) I, II, III.** The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

**3. Elementary French (5) I, II, III.** The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

**8. French Conversation (2) I, II, III.** The Staff  
Recitation—3 hours. Prerequisite: course 3 or the equivalent. Practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

**20. Practical Phonetics (2) II, III.** The Staff  
Lecture/laboratory—3 hours. Prerequisite: course 3 or the equivalent. Practically oriented presentation of French sounds and intonational patterns. Laboratory drills with emphasis on phonetic features specific to contemporary spoken French. Students will use the international phonetic alphabet. Not open for credit to students who have completed course 5. (Former course 5.)

**21. Intermediate French (5) I, II, III.** The Staff  
Lecture/discussion—5 hours. Prerequisite: course 3. Grammar, oral practice, composition. Initiation to French institutions; reading and discussion of short literary texts.

**22. Intermediate French (5) I, II, III.** The Staff  
Lecture/discussion—5 hours. Prerequisite: course 21. Continuation of course 21. Grammar, oral practice, composition. Contemporary French culture; reading and discussion of a play.

**23. Intermediate French (5) I, II, III.** The Staff  
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.

**\*25. Introduction to French Literature in Translation (3) II.** The Staff

Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major authors, genres, literary periods/movements. Study of literary techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the non-major. GE credit: ArtHum, Wrt.

**\*35. Explication and Dissertation (2) III.**

The Staff (Chairperson in charge)  
Lecture/discussion—2 hours. Prerequisite: course 22. Theory and practice of French *explication de texte* and *dissertation*. Especially recommended for those students planning to study abroad in French universities.

**38. Intermediate French Conversation (2) I, II, III.** The Staff

Recitation—3 hours. Prerequisite: course 8 or the equivalent. Continued practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

**50. French Film (4) III.** Van Den Abbeele  
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.

**\*98. Directed Group Study (1-5) I, II, III.** The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

## Upper Division Courses



**100. Composition in French** (4) I, II, III. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 23; course 20 strongly recommended. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building.

**101. Introduction to French Poetry** (4) I, II, III.  
The Staff

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.

**102. Introduction to French Drama** (4) I, II, III.  
The Staff

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.

**103. Introduction to French Prose** (4) I, II, III.  
The Staff

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.

**104. Translation** (4) I, II. The Staff

Lecture—3 hours; numerous short in-class translations; frequent supplementary outside reading. Prerequisite: course 100 or the equivalent. Practice in English-to-French translation using a variety of non-literary materials, illustrating different problems and styles. Not open to students who have spent an academic year as an EAP student in a Francophone country or who have completed course 138.

**106. French in Business and the Professions** (4) I. The Staff

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.

**107N. The Making of Modern France** (4) I.  
The Staff

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.

**108. Contemporary French Culture** (4) II.  
The Staff

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Study of contemporary French culture through focus on specific topics such as women and French culture, decolonization and modernization, the politics of education, immigration in France, Francophone cultures. Offered in alternate years. GE credit: ArtHum.

**110. Stylistics and Creative Composition** (4) II.  
Manoliu

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.

**\*112. Masterpieces of French Drama in Translation** (3) II. The Staff

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic structure and techniques. Consideration of this genre within French social and cultural context. Intended for the nonmajor. GE credit: ArtHum, Wrt.

**\*113. Masterpieces of French Novel in**

**Translation** (3) III. The Staff

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Novels in translation representing works from the seventeenth century to the present. Study of broad generic, theoretical, and historical contexts in France. Analysis of structure and techniques of the genre. Intended for the nonmajor. GE credit: ArtHum, Wrt.

**\*114. French Philosophical Literature in Translation** (3) III. The Staff

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad philosophic, moral, and historical contexts. Focus on such topics as stoicism, classicism, libertinism, naturalism, existentialism, absurdism. Literary techniques and styles analyzed. GE credit: ArtHum, Wrt.

**\*115. Medieval French Literature and Society** (4) I. Van Den Abbeele

Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The 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.

**116. The French Renaissance** (4) III. Van Den Abbeele

Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. 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. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

**117A. Baroque and Preclassicism** (4) II.  
Van Den Abbeele

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.

**117B. The Classical Moment** (4) III. Van Den Abbeele

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 once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

**118A. The Age of Reason and Revolution** (4) II.  
Kusch

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.

**\*118B. Private Lives and Public Secrets: The Early French Novel** (4) II. Kusch

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.

**\*119A. The Romantic Imaginary** (4) II. Constable  
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.

**119B. Realism, History and the Novel** (4) III.  
Constable

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 situ-

ation of post-revolutionary society. Offered in alternate years. GE credit: ArtHum.

**119C. From Baudelaire to Surrealism** (4) I.  
Constable

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.

**120. Modern French Thought** (4) I. Praeger

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.

**121. Twentieth Century French Novel** (4) II.  
Praeger

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.

**124. Post-Colonialist and Francophone Literature** (4) III. Praeger

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 once for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.

**\*125. French Literature and Other Arts** (4) II.  
The Staff

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 once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

**127. Paris: Modernity and Metropolitan Culture** (4) III. The Staff

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.

**\*130. From Page to Stage: Theatre and Theatricality** (4) I. The Staff

Lecture/discussion—3 hours; term paper. Prerequisite: course 102. French theater as literature and performance. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

**133. Gender and Politics in French Literature and Culture** (4) I. The Staff

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.

**\*138. Advanced Literary Translation** (4) II.  
The Staff

Lecture—3 hours; numerous short in-class translations; frequent supplementary outside assignments. Prerequisite: course 100 or the equivalent, course 104 or the equivalent (such as one academic year as an EAP student in a Francophone country). English-to-French translation of a variety of modern literary texts.

**\*140. Study of a Major Writer** (4) II. The Staff

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 once for credit as author-subject changes.

**141. Selected Topics in French Literature** (4) II. The Staff

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 twice for credit when topic differs.

**\*160. Topics in French Morphosemantics** (4) III. Manoliu

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 and Linguistics 1. Analysis of controversial grammatical phenomena with emphasis on the semantic content and the pragmatic function of such categories as tense, mood and gender. Offered in alternate years.

**\*161. Modern French Syntax** (4) III. Manoliu

Lecture—3 hours; short papers. Prerequisite: course 160. Presentation of basic concepts of contemporary approaches to French syntax. Consideration of new explanations of so-called "irregular" phenomena in current language models.

**\*162. History of French Language** (4) II. Manoliu

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.

**192. Internship** (1-12) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
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.)

**197T. Tutoring in French** (1-4) I, II, III. The Staff  
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) I, II, III. The Staff  
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) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**200. Literary Analysis** (4) I. The Staff  
Seminar—3 hours; term paper. Prerequisite: graduate standing. Basic principles of applied literary theory. Concepts and methods of the critical analysis of literature and literary texts. Basic principles of bibliographic research will be covered at the beginning of the course.

**\*201. History of French: Phonology and Morphosyntax** (4) III. Manoliu  
Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main changes in the phonematic and grammatical structures of French, from Latin to contemporary spoken aspects.

**\*205A. Sixteenth-Century Literature: The Humanists** (4) I. Van Den Abbeele  
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.

**\*206A. Seventeenth-Century Literature: Theater** (4) II. Van Den Abbeele  
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.

**206B. Seventeenth-Century Literature: Prose** (4) I. Van Den Abbeele  
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.

**\*206C. Seventeenth-Century Literature: Poetry** (4) III. Van Den Abbeele  
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.

**\*207A. Eighteenth-Century Literature: Philosophies** (4) II. The Staff  
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.

**\*207B. Eighteenth-Century Literature: Novel** (4) III. The Staff  
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.

**208A. Nineteenth-Century Literature: Fiction** (4) I. Constable  
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.

**\*208B. Nineteenth-Century Literature: Poetry** (4) III. Constable  
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.

**209A. Twentieth-Century: Prose** (4) II. Praeger  
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several writers of the period.

**\*209B. Twentieth-Century: Theater** (4) II. The Staff  
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.

**\*209C. Twentieth-Century: Poetry** (4) III. Blanchard  
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.

**210. Studies in Narrative Fiction** (4) I. Praeger  
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**211. Studies in Criticism** (4) II. Blanchard  
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**\*212. Studies in the Theater** (4) I. The Staff  
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**\*213. Studies in Poetry** (4) II. The Staff  
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**214. Study of a Literary Movement** (4) III. The Staff  
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**\*238. Advanced Literary Translation** (4) III. The Staff  
Seminar—3 hours; significant amounts of translation of texts. Designed to acquaint students with the basic principles of applied translation theory. Translation of texts chosen for their theoretical interest. Open to native French speakers only with consent of instructor.

**250A. French Linguistics: Morphematics** (4) I. Manoliu  
Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on morphematics, i.e., a semantic analysis of grammatical categories, as well as of their paradigmatic and syntactic relations.

**\*250B. French Linguistics: Transformational Syntax** (4) I. Manoliu  
Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectivization, passivization, relativization) focusing on the most recent developments in the field (i.e., case grammars, generative semantics, trace theory).

**251. Trends in French Contemporary Linguistics** (4) I. Manoliu  
Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. Intended for students in French linguistics or those interested in applying linguistic models to literature. May be repeated once for credit with consent of instructor when topic differs.

**\*261. Current Issues in Modern French Syntax** (4) II. Manoliu  
Seminar—3 hours; term paper. Prerequisite: course 161. Presentation of contemporary approaches to French syntax. Explanations of various less regular phenomena, with reference to on-going changes in modern spoken French. May be repeated for credit with consent of instructor when topic differs. Offered in alternate years.

**297. Individual Study** (1-5) I, II, III. The Staff (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Seminar—1-5 hours. May be repeated for credit with consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III. The Staff (S/U grading only.)

**Professional Courses**

**\*300. Teaching of a Modern Foreign Language** (3) III. The Staff  
Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

**390A. The Teaching of French in College (2) I.**

Wagnild

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.)

**390B. The Teaching of French in College (2) II.**

Wagnild

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.)

**390C. The Teaching of French in College (2) III.**

Wagnild

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.)

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Freshman Seminar Program

Francisco J. Samaniego, Ph.D., Program Director  
Program Office, 17 Wellman (Teaching Resources Center) (530-752-6050)

World Wide Web: <http://trc.ucdavis.edu/TRC>

**Committee in Charge**James Baughn, Ph.D. (*College of Engineering*)Masako Darrrough, Ph.D. (*Graduate School of Management*)Marina Estabrook, M.A. (*Teaching Resources Center*)William Hornof, D.V.M., Ph.D. (*School of Veterinary Medicine*)Annie King, Ph.D. (*College of Agricultural and Environmental Sciences*)Nora McGuinness, Ph.D. (*Integrated Studies, Davis Honors Challenge*)Beth Ober, Ph.D. (*Academic Senate Committee on Courses*)Rex Perschbacher, J.D. (*School of Law*)Larry Stark, Ph.D. (*School of Medicine*)Fred Wood, Ph.D. (*College of Letters and Science*)**Course in Freshman Seminar (FRS)**

(Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.)

**Lower Division Course**

**1A-Z. Freshman Seminar (2) I, II, III.** The Staff Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 45 quarter units. Investigation of a special topic (A-Z) through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

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## Genetics

**See Biological Sciences: Section of Molecular and Cellular Biology; and Genetics (A Graduate Group)**


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## Genetics (A Graduate Group)

Richard Michelmore, Ph.D., Chairperson of the Group

Group Office, 188 Briggs Hall (530-752-9092)

World Wide Web:

<http://www-ggc.ucdavis.edu/ggc/ggg>

**Faculty.** Includes members drawn from the Colleges of Agricultural and Environmental Sciences, and Letters and Science, Division of Biological Sciences, and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. The Group is subdivided into three affinity groups: molecular, animal, and plant. Each of these affinity groups provides broad training in genetics, combined with an emphasis specific to its area. Both model genetic organisms and agricultural species are studied using molecular and classical approaches. For additional information regarding the program, contact the group administrative assistant at 530-752-9092.

**Graduate Adviser.** Consult Genetics Graduate Group Office.

**Courses in Genetics (GGG)****Graduate Courses****201A. Transmission Genetics (3) I.** The Staff

Lecture—3 hours. Prerequisite: Biological Sciences 101, introductory statistics and calculus. Study of segregation, linkage, and mapping and the modifications of Mendel's original genetic model.

**201B. Cytogenetics (3) II.** Dvorak and Murray

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuploidy, trisomics, monosomics, autopolyploids and intra- and interspecific manipulation.

**201C. Molecular Genetics (3) III.** The Staff

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Current topics in molecular genetics at a graduate level, with emphasis on the relationship between classical genetic studies and current molecular research, as well as on the molecular techniques used to develop the basic concepts of molecular genetics.

**201D. Quantitative and Population Genetics (3) II.** St. Clair, Famula, Shaw

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. The basic concepts of quantitative and population genetics, including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

**205. Molecular Genetics Laboratory (5) I, II, III.**

The Staff

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.)

**207L. Research Methods in Plant Genetics****Laboratory (2-5) I, II, III.** The Staff

Laboratory—6-15 hours. Prerequisite: course 207 (may be taken concurrently). Working knowledge of contemporary methodologies in plant genetics is obtained by participating in research programs of the various Plant Genetics Affinity Group members. (S/U grading only.)

**291. Seminar in History of Genetics (2) II.**

Griesemer (Philosophy)

Seminar—2 hours. Prerequisite: Biological Sciences 101. The development of modern genetic theories beginning with Mendel.

**292A. Seminar in Cytogenetics (1-3) I.** The Staff

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the deletion, duplication and rearrangement of chromosome regions. Offered in alternate years.

**292B. Seminar in Quantitative Genetics (1-3) II.**

The Staff

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the inheritance of continuous characters. Offered in alternate years.

**\*292C. Seminar in Developmental Genetics (1-3) I.** The Staff

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics in the area of cell-specific control of genes in development. Offered in alternate years.

**\*292D. Seminar in Population, Evolutionary and Ecological Genetics (1-3) II.** The Staff

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the analysis and prediction of genetic changes in populations. Offered in alternate years.

**293. Seminar in Animal Genetics (1-3) III.**

The Staff

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.

**295. Seminar in Molecular Genetics (1-3) I.**

The Staff

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the structure, modification and expression of genes.

**296. Scientific Professionalism and Integrity (2) I.** Yoder

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.)

**297. Seminar in Plant Genetics (1-3) II.** The Staff

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.

**298. Group Study (1-5) I, II, III.** Members of the Group (Chairperson in charge)

Prerequisite: consent of instructor. Group study of selected topics in genetics. (S/U grading only.)

**299. Research (1-12) I, II, III.** Members of the Group (Chairperson in charge)

(S/U grading only.)



# 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 Agricultural Systems and Environment 120 or Civil and Environmental Engineering 114, and Agricultural Systems and Environment 21 or Computer Science Engineering 15.

## Minor Program Requirements:

UNITS

|                                                                                                                                                            |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Geographic Information Systems</b> .....                                                                                                                | <b>18</b> |
| Applied Biological Systems Technology 180, 181 .....                                                                                                       | 10        |
| Select 8 or more units from the following courses .....                                                                                                    | 8         |
| Agricultural Systems and Environment 121, Applied Biological Systems Technology/Hydrologic Science 182, Environmental and Resource Sciences 105, 185, 186. |           |

Minor Advisers: R. Plant, W. Wallender.

# 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.

## Minor Program Requirements:

UNITS

|                                                                                                                                                                                                                |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Geographic Studies</b> .....                                                                                                                                                                                | <b>20</b> |
| Geography 10 .....                                                                                                                                                                                             | 3         |
| Select at least one course from three of the following areas .....                                                                                                                                             | 17        |
| <i>(a) Human geography:</i>                                                                                                                                                                                    |           |
| Human and Community Development 141, 142; International Agricultural Development 104; Environmental and Resource Sciences 173; or other courses approved by the adviser.                                       |           |
| <i>(b) Methods in geography:</i>                                                                                                                                                                               |           |
| Environmental and Resource Sciences 105, 185, 186; or other courses approved by the adviser.                                                                                                                   |           |
| <i>(c) Regional ecosystems:</i>                                                                                                                                                                                |           |
| Landscape Architecture 168; Wildlife, Fish and Conservation Biology 156, 157; Environmental and Resource Science 144; Evolution and Ecology 121; Geography 123, 131; or other courses approved by the adviser. |           |

*(d) Individual study:*

Select a maximum of 4 units of 192 (Internship) or 199 (Research) in any appropriate department.

Minor Adviser. D.J. Dingemans.

# Geography

## Courses in Geography (GEO)

### Lower Division Courses

- 1. Physical Geography** (4) I. Jett  
Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.
- 2. Introduction to Cultural Geography** (3) III. Allan  
Lecture—3 hours. Traditional systems of habitat use: their characteristics, origin, occurrence, ecology. Development of contemporary cultural patterns and patterns in man-land relationships. Emphasis on the nonindustrial world. GE credit: SocSci.
- 2G. Introduction to Cultural Geography: Discussion** (1) III. Allan  
Discussion—1 hour; short papers. Prerequisite: course 2 concurrently. Small group discussion of topics and readings assigned for course 2. Preparation and discussion of short papers. GE credit with concurrent enrollment in course 2: Wrt.
- 10. The World's Regions** (3) I. The Staff; II. Dingemans; III. Allan  
Lecture—3 hours. The major geographic regions of the world; their origins, physical environments, cultures and economies; their interactions and global roles. Designed for non-majors.
- 98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)
- 99. Independent Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor, primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

- \*121. North America** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human forces have contributed to their variety. Regional stresses within and between the two countries.
- 123. Western Europe** (3) I. Dingemans  
Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social, and political problems of the countries of Western Europe.
- \*126. Southern Asia** (3) I. The Staff  
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Offered in alternate years.
- 131. California** (4) III. Dingemans  
Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, vegetation, and soils; water, agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.
- \*143. Political Geography** (4) III. Dingemans  
Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.
- \*151. History of Geographic Thought** (4) III. The Staff  
Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of

geography: objectives, subdivisions, and development of the subject.

**\*155. Urban Geography** (4) I. Dingemans  
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning policy, transportation systems, and residential structure.

**161. Conservation of Resources and Environment** (4) I. Jett  
Lecture—4 hours. Principles of natural-resource and environmental-quality conservation. Land use conflicts between forestry, agricultural, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

**\*170. Cultural Ecology** (4) II. Jett  
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals.

**171. Cultural Geography** (4) III. Jett  
Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links with, and parallels in, other disciplines.

**192. Student Internship in Geography** (2-4) I, II, III. The Staff  
Internship—5-15 hours at employing agency; term paper. Prerequisite: consent of undergraduate Geography major adviser and consent of instructor. Supervised program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates.** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

# Geography (A Graduate Group)

Michael G. Barbour, Ph.D., Chairperson of the Group  
Group Office, 152 Walker Hall (530-752-4119;  
geography@ucdavis.edu)

**Faculty.** Includes more than 50 members drawn from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, the Division of Biological Sciences, and the Schools of Medicine and Veterinary Medicine.

**Graduate study.** The Graduate Group in Geography 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 environment. Areas of thematic emphasis include biogeography, cultural-human geography, medical-nutritional geography, and physical-environmental geography. Research is international in location; current projects are located in the Caribbean, South America, Europe, the Middle East, Asia, and the United States (especially in the southwest).

**Preparation.** Most students considered for admission will have completed an undergraduate major in geography or a closely related field. They normally will have completed a course in any three of the following areas: field methods in geography, cartography,

\*Course not offered this academic year.

remote sensing, statistics, GIS, geographic theory. They usually will have completed one course each in human geography, physical geography, and a geographic region.

**Graduate adviser.** J. Momsen.

## Courses in Geography (GEO)

### Graduate Courses

#### 200. Research Trends in Geography (1)

The Staff (Chairperson in charge)  
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.)

#### 200B. Geographical Concepts (4) I. Dingemans, Grivetti, Barbour

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.

#### 200C. Theory and Practice of Geography (4) II. Momsen

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.

#### 200D. Research Methods in Geography (4) III. Elliot-Fisk, MacCannell

Lecture—3 hours; term paper. Prerequisite: graduate standing, course 200B and 200C, or consent of instructor. Survey of research methods in geography, including the use of logic, theory and paradigms, research design, and analytical techniques, including statistics and modeling.

#### \*201. Sources and General Literature of Geography (4) I, II, III. The Staff

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.

#### \*202. Arctic and Alpine Environments (4) III. The Staff

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 118 or consent of instructor. Analysis of cold climate processes in high latitudes and high altitudes. Interdisciplinary evaluation of arctic and alpine environments; including glaciation and permafrost, vegetation development and landscape change through time; effects of climatic change. Offered in alternate years.

#### \*290. Seminar: Selected Regions (4) III. The Staff

Seminar—3 hours. Region to be announced annually.

#### \*291. Seminar in Cultural Geography (4) III. Jett

Seminar—3 hours.

#### \*292. Seminar in Plant Geography (4) I. Bahre

Seminar—3 hours; seminar paper. Prerequisite: graduate standing. Examination of that aspect of cultural plant geography dealing with human impacts and vegetation change in the earth's major biomes. Particular emphasis on the New World's savannas, deserts, and grasslands. Offered in alternate years.

#### \*294. Seminar in Climatology (4) II. The Staff

Seminar—3 hours.

#### 295. Seminar in Urban Geography (4) II. Dingemans

Seminar—3 hours.

#### \*296. Seminar in Agricultural Geography (4) II. The Staff

Seminar—3 hours.

#### 297. Graduate Group in Geography Seminar (2) I, II, III. The Staff

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) I, II, III. The Staff

Prerequisite: consent of instructor.

#### 299. Research (1-12) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

#### 299D. Individual Study (1-12) I, II, III. The Staff

Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

### Professional Course

#### 396. Teaching Assistant Training Practicum

(1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Geology

(College of Letters and Science)

Jeffrey F. Mount, Ph.D., Chairperson of the Department

Department Office, 174 Physics/Geology Building  
(530-752-0350)

World Wide Web: <http://www-geology.ucdavis.edu>

### Faculty

Sandra J. Carlson, Ph.D., Associate Professor  
William H. Casey, Ph.D., Professor (*Land, Air and Water Resources*)

Richard Cowen, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*

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*)

Louise H. Kellogg, Ph.D., Associate Professor

Charles E. Leshner, Ph.D. Associate Professor

James S. McClain, Ph.D., Associate Professor

Isabel P. Montañez, Ph.D., Associate Professor

Eldridge M. Moores, Ph.D., Professor

Jeffrey F. Mount, Ph.D., Professor

Alexandra Navrotsky, Ph.D., Professor

(Thermochemistry Facility, Chemistry)

Peter Schiffman, Ph.D., Professor

Howard J. Spero, Ph.D., Associate Professor

Dawn Y. Sumner, Ph.D., Assistant Professor

Robert J. Twiss, Ph.D., Professor

Geerat J. Vermeij, Ph.D., Professor

Kenneth L. Verosub, Ph.D., Professor, *Academic*

*Senate Distinguished Teaching Award*

Robert A. Zierenberg, Ph.D., Professor

### Emeriti Faculty

Charles G. Higgins, Ph.D., Professor Emeritus

Robert A. Matthews, A.B., Senior Lecturer 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 the history, the structure, the evolution of life, and the processes that have molded the Earth and its inhabitants. The coming of the space age has also extended the field to include the solid planets of the solar system. Although often attracted to the study of geology by an aesthetic appreciation and enjoyment of the earth, geologists commonly approach their studies from an interest either in the academic or the applied aspects of the science.

The academic aspects include the study of the history of life, the Earth, and the planets, and of the processes that drive the historical evolution. The study of historical evolution through "deep time" is what fundamentally distinguishes geology from most of the other

physical sciences. The study of the processes that drive this evolution can involve the application of any of the physical or life sciences to understanding the Earth. In this sense, geology is truly an interdisciplinary science.

The applied aspects of the science generally involve the interaction between humans and the earth. Applied studies include the study of mineral resources including oil and water; identification and mitigation of Earth hazards such as earthquakes, landslides, and volcanic eruptions; identification and mitigation of polluted ground water; and land use planning.

**The Program.** Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect 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. High school preparation for either program should include high school chemistry and four years of mathematics or the equivalent.

**Internships and Career Alternatives.** The largest employer of geologists has traditionally been the oil industry, although recently more opportunities have been available in environmental geology with consulting firms and government agencies. Government organizations and research laboratories also employ geologists in a variety of other capacities. There is a growing need for earth science teachers at all pre-college levels, and colleges and universities provide opportunities in teaching and research. Entry level positions are available with a Bachelor's degree. A Master's degree is the usual professional level degree, and a Ph.D. is generally required for research and academic positions. Internships during undergraduate training are a means of exploring potential career opportunities and 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, and various consulting firms.

### A.B. Major Requirements:

|                                                                                                                                                                                                                  |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                  | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                          | <b>41-44</b> |
| Geology 3, 3L, 50, 50L, 60, 60L.....                                                                                                                                                                             | 14           |
| 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          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                | <b>36</b>    |
| Geology 100, 100L, 101, 101L, 103, 107, 107L, 108N, 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 <i>in advance</i> by the major adviser..... | 12           |
| <b>Total Units for the Major</b> .....                                                                                                                                                                           | <b>77-80</b> |

#### Recommended

Chemistry 2C or Hydrologic Science 134, Physics 7C.

### B.S. Major Requirements:

|                                              |              |
|----------------------------------------------|--------------|
|                                              | UNITS        |
| <b>Preparatory Subject Matter</b> .....      | <b>56-58</b> |
| Geology 3, 3L, 50, 50L, 60, 62.....          | 15           |
| Mathematics 21A-21B-21C .....                | 12           |
| Chemistry 2A-2B .....                        | 10           |
| Select one of the following three options:   |              |
| <b>General Geology</b> option:               |              |
| Hydrologic Science 134 or Chemistry 2C ..... | 4-5          |
| Statistics 32 or 102.....                    | 3-4          |
| Physics 7A-7B-7C .....                       | 12           |

**Geochemistry/Petrology** option:  
 Hydrologic Science 134 or Chemistry 2C .....4-5  
 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** .....54  
 Geology 100, 100L, 101, 101L, 102N, 103, 105N, 106N, 107, 107L, 108N, 109, 109L, 110 .....42  
 Additional upper division electives chosen from Geology 130–190 courses, Hydrologic Science 145A, 145B 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** .....110-112

**English Composition Requirement**  
 It is recommended that all majors complete the English composition requirement (English 101 or 102 or 104 or the equivalent) before or concurrently with the following courses: Geology 100, 101, 105N, 106N, 108N, 109L, 110.

**Recommended**  
 For those who are intending to pursue a career in geology or who are planning to apply to graduate programs in the earth sciences, one or more of the following courses are recommended for any of the options or specifically 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.** A.B. degree: R. Cowen; B.S. degree: I.P. Montañez, R.A. Zierenberg, R.J. Twiss.

**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**.....18-24  
 Select one of the five emphases below.

**General Geology** emphasis .....19  
 Geology 50 and 50L (or 1 and 1L).....5  
 Geology 100, 101, 109 and either 107 or 108N.....11  
 Geology 116 or 134 or 135 .....3

**Minor Advisers.** R. Cowen, R.J. Twiss.

**Engineering Geology** emphasis .....19-22  
 Geology 50 and 50L.....5  
 Civil Engineering 171, 171L.....5  
 Three courses chosen from Geology 134, 161, 162N, 163, 170, Hydrologic Science 103, 145, Soil Science 118, 120 .....9-12

**Minor Adviser.** R.J. Twiss

**Geochemistry** emphasis .....19-22  
 Geology 60 and either 146N 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, 146N, 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.

**Oceanography** emphasis .....21-24  
 Geology 108N, 116, 150A, 150B, 150C....16  
 Two courses chosen from Environmental Science and Policy 100, 151, Geology 109, 151, 152N, Hydrologic Science 136...5-8

**Minor Adviser.** H.J. Spero.

**Paleobiology** emphasis .....20-21  
 Geology 107 and 107L, 108N .....8  
 Geology 151 or 152N.....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 Adviser.** R. Cowen.

**Interdisciplinary minors.** The Geology Department administers two interdisciplinary minor programs, **Environmental Geology** and **Geophysics**, which may be completed by students majoring in any discipline, including Geology. Programs for these minors are listed separately in this catalog in alphabetical order. For Geology majors, one course at most from these minor programs can be counted toward satisfaction of the Geology degree requirements.

**Integrated Science Teaching Credential.** Students wishing to prepare for the teaching credential in Integrated Science with a concentration in Geoscience may do so by satisfying the requirements for the A.B. degree in Geology (77-80 units) and 36-37 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 30-32 units as indicated by the asterisk (\*) below.

Biological Sciences 1A-1B-1C\* .....15  
 Chemistry 2C.....5  
 Physics 7C .....4  
 Geology 36\* .....4  
 Geology 116-116G\* .....5  
 Atmospheric Science 60\* or 100\* .....3-4

Students are advised to take the following courses as upper division electives in the A.B. program:  
 Geology 105, 106N, and 134\* or 135\*...12-13

**Teaching Credential Subject Representative.** H.W. Day. See also Under Education—Teacher Education.

**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.** C.E. Leshner, J.S. McClain, S.J. Carlson.

**Courses in Geology (GEL)**

**Lower Division Courses**

**1. The Earth** (4) I. The Staff; II. Cowen; III. Verosub  
 Lecture—3 hours; discussion—1 hour. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. GE credit: SciEng.

**3. History of Life** (3) II. Cowen  
 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.

**3G. History of Life: Discussion** (1) II. Cowen  
 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.

**3L. History of Life Laboratory** (1) II. Cowen  
 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.

**4. Evolution: Science and World View** (3) II. Vermeij  
 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.

**10. Modern and Ancient Global Environmental Change** (3) III. Montanez  
 Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of unsustainable resources presented in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SciEng.

**12. Evolution and Paleobiology of Dinosaurs** (2) III. Carlson  
 Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.

**17. Earthquakes and Other Earth Hazards** (2) I. Verosub  
 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.

**20. Geology of California** (2) II. Moores  
 Lecture—2 hours; demonstration—1 hour. 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. GE credit: Wrt.

**32. Volcanoes** (4) I. Schiffman  
 Lecture—3 hours; discussion/laboratory—1.5 hours. Study of how volcanoes, their eruptions, and their eruptive products shape our planet's surface, influence its environment, and provide essential human resources. (Former course 120.) GE credit: SciEng, Wrt.

**36. The Solar System** (4) III. Kellogg  
 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.

**\*43. Form, Function, and Evolution: The Molluscan Shell** (3) III. Vermeij  
 Lecture/discussion—2 hours; term paper. Prerequisite: course 1, 3, or Biological Sciences 10. Evolutionary principles relating form, function, and environment are explained through the study of shells of living and fossil molluscs. Topics include shell geometry, mechanical design, adaptation to enemies, and the distribution of shell architectural types in space and time. GE credit: SciEng, Wrt.

**50. Physical Geology** (3) I. McClain  
 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.

**50L. Physical Geology Laboratory** (2) I. McClain  
 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.

**60. Earth Materials: Introduction** (4) I. Day  
 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

\*Course not offered this academic year.



minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations.

**62. Optical Mineralogy (2) I.** Day

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.

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

**Upper Division Courses**

**100. Earth Dynamics I: Extensional and Translational Processes (3) I.** Twiss

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. Not open for credit to students who have completed course 105. GE credit: SciEng, Wrt.

**100L. Earth Dynamics I: Structure/Tectonics Laboratory (1) I.** Twiss

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. Not open for credit to students who have completed course 105L.

**101. Earth Dynamics II: Convergent and Collisional Processes (3) II.** Moores/Twiss

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 isostasy. Examples of collisions and resulting mountain belts. Examples drawn from western North America. Not open for credit to students who have completed course 105. GE credit: SciEng, Wrt.

**101L. Earth Dynamics II: Structure/Tectonics Laboratory (2) II.** Twiss

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. Not open for credit to students who have completed course 105L.

**102N. Earth Dynamics III: Plate Kinematics and Dynamics (2) III.** Kellogg/Twiss

Lecture—2 hours. Prerequisite: course 101, Mathematics 21C or 16C (may be taken concurrently), Physics 5B or 7B or 9B (may be taken concurrently); or consent of instructor. Geodynamics and the workings of plate tectonics. Kinetics of plate motions and interactions between plates. Frames of reference and hotspots. Paleomagnetism and geodesy. Dynamics of plate motion, plate driving forces, thermal structure of the Earth, thermal convection in the Earth. Not open for credit to students who have completed course 108.

**103. Field Geology (3) III.** Leshner

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. Not open for credit to students who have completed course 102.

**105N. Earth Materials: Igneous Rocks (4) II.**

Leshner

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. Not open for credit to students who have completed course 123. GE credit: SciEng, Wrt.

**106N. Earth Materials: Metamorphic Rocks (4) III.** Day

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105N, 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. Not open for credit to students who have completed course 125. GE credit: SciEng, Wrt.

**107. Earth History: Paleobiology (3) III.** Cowen

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.

**107L. Earth History: Paleobiology Laboratory (2) III.** Cowen

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.

**108N. Earth History: Paleoclimates (3) I.** Spero

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. Not open for credit to students who have completed course 114. GE credit: SciEng, Wrt.

**109. Earth History: Sediments and Strata (2) II.** Montañez/Summer

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. Not open for credit to students who have completed course 106. GE credit with concurrent enrollment in course 109L: SciEng.

**109L. Earth History: Sediments and Strata Laboratory (2) II.** Montañez/Summer

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. Not open for credit to students who have completed course 106. GE credit with concurrent enrollment in course 109: Wrt.

**110. Summer Field Geology (8) Summer Extra Session.** The Staff

Fieldwork—8 hours/day, 6 days/week for six weeks. Prerequisite: courses 103, 109; course 105N 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. Not open for credit to students who have completed course 118. GE credit: SciEng, Wrt.

**115N. Earth Science, History, and People (4) III.** Cowen

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. (Former course 131.) GE credit: SciEng or SocSci, Wrt.

**116. The Oceans (3) I.** Spero/Summer; II. Spero

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geological history, and the sea's biota; and utilization of marine resources. (Same course as Environmental Science and Policy 116.) GE credit: SciEng.

**116G. The Oceans: Discussion (2) I.**

Spero/Summer; II. Spero  
Discussion—2 hours. Prerequisite: course 116/Environmental Science and Policy 116 concurrently. Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of papers. (Same course as Environmental Science and Policy 116G.) GE credit with concurrent enrollment in course 116: Wrt.

**129. Sample Preparation and Techniques for Petrology (1) II.** Winter

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. (Former course 180.) (P/NP grading only.)

**130. Non-Renewable Natural Resources (3) II.** Zierenberg

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.

**134. Environmental Geology and Land Use Planning (3) III.** Montañez

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.

**135. Rivers of California (3) III.** Mount

Lecture—3 hours. Prerequisite: course 1. Analysis of the conflict between land use practices and river processes within California's watersheds. Survey of fluvial processes, climate and geology. Evaluation of impacts of logging, mining, agriculture, urbanization, flood control and water supply. GE credit: SciEng.

**138. Introductory Volcanology (4) Summer.** Schiffman

Lecture—2 hours; fieldwork—6 hours. Prerequisite: upper division standing, course 1 or 50, Chemistry 2A or the equivalent, or consent of instructor. A survey of the principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SciEng.

**139. Fluvial Geomorphology (5) II.** Mount

Lecture—3 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: courses 50, 50L; Mathematics 21B or 16B recommended. Advanced analysis of fluvial processes, including geomorphic evolution of rivers, floodplains and watersheds at various spatial and temporal scales, and in response to changing land use. Laboratory exercises examine methods of geomorphic analysis of rivers. Includes three weekend field trips.

**143. Advanced Igneous Petrology (5) III.** Leshner

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105N, 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. Not open for credit to students who have completed course 123. GE credit: SciEng, Wrt.

**\*144N. Sedimentary Petrology and Geochemistry** (5) I. Sumner

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 105N, 106N, 109. Petrography and geochemistry of sediments and sedimentary rocks. Textural, mineralogical, and geochemical evolution of sediments during burial. Ground water-rock interactions and resulting influence on petrographic textures and geochemistry of pore fluids. Not open for credit to students who have completed course 124. GE credit: SciEng, Wrt.

**\*145N. Advanced Metamorphic Petrology** (5) II. Day

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106N; 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. Not open for credit to students who have completed course 125. GE credit: SciEng, Wrt.

**146N. Isotope Geochemistry** (3) II. Day

Lecture—3 hours. Prerequisite: Chemistry 2C or consent of instructor. Principles and applications of nuclear chemistry to geology. Methods of determining geologic ages using K-Ar, Rb-Sr, Nd-Sm, and U-Pb isotopes. The interpretation of apparent ages determined by isotopic methods. The age and origin of the earth. Offered in alternate years.

**147. Geology of Ore Deposits** (4) I. Zierenberg  
Lecture—3 hours; laboratory—3 hours; optional one-weekend field trip. Prerequisite: Chemistry 2C or Hydrologic Science 134, courses 60, 62, and 105N. 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.

**148. Stable Isotopes and Geochemical Tracers** (3) I. Zierenberg

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.

**150A. Physical and Chemical Oceanography** (4) I. McClain, Zierenberg

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. Offered in alternate years. (Same course as Environmental Science and Policy 150A.)

**150B. Geological Oceanography** (3) II. McClain  
Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to the origin and geologic evolution of the 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.)

**150C. Biological Oceanography** (3) III. The Staff  
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea, and plankton communities. Existing knowledge and contemporary issues in research will be equally stressed. A portion of the course will be devoted to man's use of and impact on the ocean. Offered in alternate years. (Same course as Environmental Science and Policy 150C.)

**\*151. Paleobiology of Invertebrata** (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107, 107L. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates. Offered in alternate years. Not open for credit to students who have completed course 111A.

**\*152N. Paleobiology of Protista** (4) II.

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. Not open for credit to students who have completed course 111B.

**\*161. Exploration Geophysics and Seismology** (3) III. Bürgmann

Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Principles of exploration geophysics and seismology. Use of gravity, magnetic, electrical resistivity, electromagnetic, and seismic measurements to determine structure of the Earth's crust. Interpretation of data using computers. Survey of well-logging techniques. Seismology and earthquakes. Not open for credit to students who have completed course 117A.

**162N. Geophysics of the Solid Earth** (3) I. Kellogg

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. Not open for credit to students who have completed course 117B.

**\*163. Fluid Flow of the Earth** (3) I.

Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Principles of fluid flow as applied to problems in geological sciences. Flow in volcanic pipes and artesian springs. Porous flow in natural systems. Thermal convection. Convection in the Earth's mantle and in the oceans. Not open for credit to students who have completed course 117C.

**\*170. Fracture and Flow of Rocks** (3) III. Twiss  
Lecture—3 hours. Prerequisite: courses 101, 101L; Mathematics 21B or 16B; Physics 5A or 7A or 9A; or consent of instructor. Examination of the origin of structures in rocks associated with brittle and ductile deformation on the basis of continuum mechanics and experiment. Emphasis on interpretation of the structures in terms of the deformational processes that occur in the Earth. Offered in alternate years.

**175. Advanced Field Geology** (1-6) I, II, III.

Fieldwork—3-18 hours. Prerequisite: course 110 or graduate standing in Geology. Advanced problems and methods in geologic field studies. Preparation of a geologic report. May be repeated up to a total of six units when topic differs, including units received for course 185.

**190. Seminar in Geology** (1) I. Kellogg; II. Vermeij; III. Moores

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.)

**192. Internship in Geology** (1-12) I, II, III.

The Staff (Chairperson in charge)  
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) I-III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: senior standing in Geology or consent of instructor.

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)**Graduate Courses**

**205. Advanced Field Stratigraphy** (3) II. Sumner  
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.

**206. Stratigraphic Analysis** (3) I. Montañez  
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. Offered in alternate years.

**\*214. Active Tectonics** (3) II. Bürgmann  
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.

**\*215N. Stable Isotope Geochemistry** (3) II.  
Lecture—3 hours. Prerequisite: Chemistry 110A, Mathematics 22B; or consent of instructor. Principles of equilibrium and kinetic isotope fractionation and material balance with special application to the distribution of oxygen and hydrogen isotopes in natural systems. Topics include isotope hydrology geothermometry and paleotemperatures, igneous rocks and materials, and fluid-rock interaction. Offered in alternate years. (Former course 215B.)

**\*216. Tectonics** (3) I. Moores  
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.

**\*217. Topics in Geophysics** (3) II. Bürgmann  
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.

**218N. Analysis of Structures in Deformed Rocks** (3) III. Twiss

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. (Former course 218A.)

**\*220. Mechanics of Geologic Structures** (3) II. Twiss

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) II. Sumner

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.

**\*227. Stable Isotope Biogeochemistry** (4) III. Spero

Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing or 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.

**\*228. Topics in Paleoclimatology** (3) III. Spero  
Lecture—3 hours. Prerequisite: courses 108N, 150A or consent of instructor. Critical discussion and review of selected topics in paleoclimatology 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.

**\*230. Advanced Mineralogy** (3) II. Leshner  
Lecture—3 hours. Prerequisite: introductory mineralogy and differential equations or consent of instructor. Crystallography and crystal chemistry of rock-forming mineral and high pressure phases. Mechanism of phase transformations, with emphasis on pressure-induced polymorphism. Effect of kinetics and diffusion on mineral behavior. Processes of exsolution, order/disorder, and crystallization. Offered in alternate years.

**235. Surface Processes** (3) II. Mount  
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.

**\*236. Inverse Theory in Geology and Geophysics** (3) III. McClain  
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.

**238. Theoretical Seismology** (3) III. McClain  
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.)

**\*240. Geophysics of the Earth** (3) II. Kellogg  
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.

**\*241. Geomagnetism** (3) I. Verosub  
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.

**242. Paleomagnetism** (3) II. Verosub  
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 mag-

netic properties. Geological and geophysical applications. Offered in alternate years.

**\*246. Physical Chemistry of Metamorphic Processes** (3) II. Day  
Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physicochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years.

**247. Metamorphic Petrology Seminar** (3) II. Day  
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.)

**250. Advanced Geochemistry Seminar** (3) III. Zierenberg  
Seminar—3 hours. Prerequisite: course 146N 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.

**253. Current Topics in Igneous Petrology** (3) I. Leshner  
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.)

**\*254. Physical Chemistry of Igneous Processes** (3) III. Leshner  
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.

**\*255. Experimental Petrology** (3) III. Leshner  
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.

**260. Paleontology** (3) I. Vermeij; II. Carlson  
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.

**\*269. Evolutionary Biology of Protista** (3) II. The Staff  
Seminar—3 hours. Prerequisite: course 152N. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in alternate years.

**282. Geological X-Ray Spectrometric Analysis** (4) III. Schiffman  
Lecture—3 hours; laboratory—3-4 hours. Prerequisite: course 60-60L, Chemistry 2C, Physics 9C, and graduate standing in Geology. Theory of generation and detection of x-rays as applied to analytical chemistry of rocks and minerals. Laboratory sessions on use of the x-ray fluorescence spectrometer, electron microprobe, and x-ray diffractometer.

**290. Seminar in Geology** (1) I. Kellogg; II. Vermeij; III. Moores  
Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.)

**291. Geology of the Sierra Nevada** (1) III. Day  
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.)

**292. River Forum** (1) I, II, III. Mount  
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.)

**294. Structure/Tectonics Forum** (1) I, II, III. Twiss  
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.)

**\*295. Advanced Problems in Geodynamics** (3) III. Twiss  
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) I. Moores  
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) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Courses**

**390. Methods of Teaching Geology** (1) I. McClain  
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.)

**\*391. Ethical Issues in Earth Sciences** (1) I. Kellogg  
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.)

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## Geophysics

(College of Letters and Science)

Geophysics is 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 who require a significant knowledge in the field. The curriculum reflects the need for such students to have a firm foundation of geophysics classes, as well as courses from the vast diversity of subdisciplines from many departments that are included in geophysics.



The minor is sponsored by the Department of Geology, 174 Physics/Geology Building.

**Minor Program Requirements:**

|                                                     |              |
|-----------------------------------------------------|--------------|
|                                                     | UNITS        |
| <b>Geophysics.....</b>                              | <b>21-24</b> |
| Engineering 5 .....                                 | 3            |
| Geology 161, 162N .....                             | 6            |
| Applied Science Engineering 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.** J.S. McClain, Department of Geology, 275A Physics/Geology, 752-7093.

**German**

(College of Letters and Science)

\_\_\_\_\_, Ph.D., Chairperson of the Department

Department Office (German and Russian),  
616 Sproul Hall (530-752-4999)

World Wide Web: <http://german.ucdavis.edu>

**Faculty**

- Clifford A. Bernd, Dr.Phil., Professor
- Gail Finney, Ph.D., Professor
- Ingeborg Henderson, Ph.D., Senior Lecturer,  
*Academic Senate Distinguished Teaching Award*
- Anna K. Kuhn, Ph.D., Professor
- Winder McConnell, Ph.D., Professor
- Karl R. Menges, Dr.Phil., Professor
- Peter M. Schaeffer, Ph.D., Professor

**Emeriti Faculty**

- John F. Fetzter, Ph.D., Professor Emeritus
- Roland W. Hoermann, Ph.D., Professor Emeritus
- H. Guenther Nerjes, Ph.D., 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        |
| <b>Preparatory Subject Matter .....</b> | <b>16-27</b> |
| German 1-2-3 (or the equivalent).....   | 0-15         |
| German 20, 21, 22 .....                 | 12           |
| <b>Depth Subject Matter .....</b>       | <b>44</b>    |

**General Program**

German 101A, 101B, 103..... 12  
 German 120 ..... 4  
 Three courses chosen from upper division literature offerings taught in German.... 12  
 Four additional upper division courses selected from 104-109 and 121-198, upon the explicit advance approval of the undergraduate major adviser ..... 16  
 The above category may be satisfied in part by one or more courses in Comparative Literature, in another national literature, or from German literature-in-translation offerings (110-119, 140-142C) upon consultation with, and advance approval of, the undergraduate major adviser.

**German Culture and Commerce Emphasis**

German 103, 104A, 109A, 109B ..... 16  
 German 118E or 120 ..... 4  
 German 143, 192 ..... 12  
 Three elective courses from at least two of the following subjects ..... 12  
 Economics 110B, 116, 160A, 160B, 162, 123, 137  
*Recommended:* International Relations 1, German 101A, 101B, 104B

**German Area Studies Emphasis**

German 101A, 101B, 103..... 12  
 German 120 ..... 4  
 Two courses chosen from upper division literature courses that are taught in German ..... 8  
 History 144 ..... 4  
 Four elective courses in accordance with the student's interest chosen from at least two of the following three areas after consultation with and approval of the adviser .. 16  
*Humanities:*  
 History 143, Philosophy 170, 175, 177.  
*Social Sciences:*  
 Economics 174, Geography 123, Political Science 117, 137.  
*Fine Arts:*  
 Art 176C, 177A, 177B, Music 110A, 110C, 110D.

Special consideration is also given to such courses in Comparative Literature as the 164 series, where pan-European movements influential upon German literature are at issue.

**Total Units for the Major .....60-71**

**Minor Program Requirements:**

The Department offers a German Language and Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate adviser.

Students are particularly encouraged to consider a minor that combines a coherent group of courses to emphasize area studies in German (i.e., German philosophy, the arts, history, political science, as well as literature). The purpose of the minor is to provide students with the opportunity to augment their training in other fields by acquiring proficiency in the German language and exposure to German literature and culture.

|                                                                                                             |              |
|-------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                             | UNITS        |
| <b>German Language and/or Literature.....</b>                                                               | <b>20-24</b> |
| Choose courses numbered from German 100 through 109B and literature courses that are taught in German ..... | 20-24        |

**Major Adviser.** P. Schaeffer.

**Honors and Honors Program.** The honors program comprises two quarters of study under course 194A-194B, which will include a research paper. See also the University and College requirements.

**Teaching Credential Subject Representative.** I. Henderson. See also under the Teacher Education 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.** K.R. Menges.

**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) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—two 1/2-hour sessions. 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.)

**2. Elementary German (5) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

**3. Elementary German (5) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

**6. Conversational German (3) I, II, III.** Henderson

Discussion—3 hours. Prerequisite: course 3. Designed to develop intermediate language skills with special emphasis on communication and grammatical accuracy. Course 6 may be taken concurrently with course 20.

**\*10. Basic Reading German (3) I.** The Staff  
 Discussion—3 hours. Intensive course for non-majors, providing reading proficiency of texts containing basic sentence patterns and standard general vocabulary. Outside preparation will focus on developing translation techniques with general texts.

**\*11. Intermediate Reading German (3) II.** McConnell  
 Discussion—3 hours. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10. Study of advanced reading grammar to gain proficiency with texts of intermediate difficulty. (P/NP grading only.)

**\*12. Advanced Reading German (3) III.** McConnell  
 Discussion—3 hours. Prerequisite: successful completion of course 11 or the equivalent. Continuation of course 11, with specialized focus for upper-division and graduate students on individualized translation projects within each student's field of academic specialization. Systematic review of reading grammar in terms of advanced reading texts. (P/NP grading only.)

\*Course not offered this academic year.

**20. Intermediate German (4) I, II.** The Staff  
Lecture/discussion—3 hours; laboratory—1 hour. 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. Not open for credit to students who have completed course 4. (Former course 4.)

**21. Composition and Conversation (4) I, II, III.** The Staff  
Discussion—3 hours; term paper. Prerequisite: course 20 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts. Not open for credit to students who have completed course 101. (Former course 101.)

**22. Composition and Conversation (4) I, II, III.** The Staff  
Discussion—3 hours; term paper. Prerequisite: course 21 or consent of instructor. Practice in short essay writing with an aim toward refinement and expansion of vocabulary. Discussion based on readings in a variety of German texts. Not open for credit to students who have completed course 102. (Former course 102.)

**\*47. Erasmus and Christian Humanism (4) II.** Schaeffer  
Lecture/discussion—3 hours; term paper. Erasmus is studied as a protagonist of contemporary ideas such as the equality of men and women, individual human dignity, peace and disarmament, pluralistic society and tolerance, in the context of Renaissance Europe, and his influence in the following centuries. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**\*48. Myth and Saga in the Germanic Cultures (4) I.** The Staff  
Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation of the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total artwork" concept and *The Ring of the Nibelung* cycle. May not be counted toward major in German. GE credit: ArtHum, Wrt.

**\*49. Freshman Colloquium (2) II.** The Staff (Chairperson in charge)  
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."

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**\*100. Intensive Conversational German (4) III.** The Staff  
Discussion—4 hours. Prerequisite: course 20. Intensive conversational practice to achieve accurate pronunciation and language fluency.

**101A. Survey of German Literature, 800–1800 (4) I.** Menges  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21. German literature from the Middle Ages to Romanticism (800-1800) with an emphasis on providing an overview of major "movements" and authors. GE credit: ArtHum.

**101B. Survey of German Literature, 1800–Present (4) III.** The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21. German literature from the age of Romanticism (1800) to the present with an emphasis on providing an overview of major "movements" and authors. GE credit: ArtHum.

**103. Writing Skills in German (4) I.** Bernd  
Lecture—3 hours; term paper. Prerequisite: course 22. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

**\*104A. Translation (4) I.** McConnell  
Lecture/discussion—4 hours. Prerequisite: course 22 or the equivalent or consent of instructor. Exercises in German-to-English, English-to-German translation using texts from the areas of culture and commerce. Offered in alternate years.

**104B. Advanced Translation (4) I.** McConnell  
Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German to English translation of literary and non-literary texts.

**\*105. The Modern German Language (4) I.** Benware  
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 20; Linguistics 1 recommended. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations.

**\*106. History of the German Language (4) II.** Benware  
Discussion—3 hours; written reports. Prerequisite: course 22; course 105 or Linguistics 1 recommended. Survey of the development of the German language and the study of its structure in historical perspective.

**\*107. Modern German Syntax (4) III.** Benware  
Discussion—3 hours; term paper. Prerequisite: course 22 or the equivalent; Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

**\*108. Varieties of Contemporary German (4) I.** Benware  
Lecture—3 hours; laboratory and/or individual/ group consultation on projects. Prerequisite: courses 22, 105. Study of relations between the standard language, *Umgangssprachen*, and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the contiguous German-speaking area of Europe.

**109A. Business German (4) II.** Henderson  
Lecture/discussion—4 hours. Prerequisite: course 22 or consent of instructor. Specialized advanced language course using business-oriented information and publications as the basis for discussions, role-play, reports, compositions and translations.

**109B. Advanced Business German (4) III.** Henderson  
Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as a sequel to German 109A. Expands on previously introduced materials and features new topics such as the EU, the European Currency System, German company forms and the stock market.

**\*111A-H. Major Writers in Translation (4) II.** The Staff  
Lecture—2 hours; discussion—1 hour; term paper. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement in each case: (A) Goethe; (B) E.T.A. Hoffmann; (C) Thomas Mann; (D) Franz Kafka; (E) Bertolt Brecht; (G) Günter Grass; (H) Friedrich Schiller. GE credit: ArtHum, Wrt.

**\*112A-C. Topics in German Literature (4) I.** Kuhn  
Discussion—3 hours; term paper. Investigation of significant themes and issues within their European context: (A) Women in Literature; (C) Literary Fairytales. Knowledge of German not required. May be repeated in different subject area. GE credit for 112A: ArtHum, Div, Wrt.

**113. Goethe's *Faust* (4) II.** Schaeffer  
Discussion—3 hours; term paper. Intensive study of one of the great works of world literature: Parts I and II. Discussions and readings in English; reading the text in the original is encouraged. GE credit: ArtHum, Wrt.

**\*114. The *Faust* Tradition Before and After Goethe (4) I.** The Staff  
Lecture—3 hours; term paper. Examines predecessors of Goethe's *Faust* (the German chapbook of 1587, Marlowe's *Tragical History of Dr. Faustus* of 1592), and some successors (Mann's novel of 1947) in order to underscore key variations of this provocative and pervasive theme. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*115A. German Literature Since 1945 (4) I.** Menges  
Lecture—3 hours; written reports. Knowledge of German not required. Reading of major writers including the post-war generation of Austria, Switzerland and West Germany. Discussion of novelists like Böll, Grass, Johnson, Walsler, Handke; playwrights such as Frisch, Dürrenmatt and Hochhuth, and poets like Celan, Enzensberger, and Aichinger. GE credit: ArtHum, Wrt.

**\*115B. German Literature since 1945 (4) II.** Kuhn  
Lecture—3 hours; written reports. Knowledge of German not required. Reading and discussion of the literature of the German Democratic Republic (East Germany), the theory of literature in the socialist world, the practice of this literature as exemplified in such authors as Strittmatter, Seghers, Wolf, Kant, Hacks.

**\*117A. The Tristan Tradition: Medieval, Musical, Modern (4) III.** McConnell  
Lecture—3 hours; term paper. Knowledge of German not required. Three different modes of the Tristan and Isolde legend: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wagner (1859) and Thomas Mann's parodistic novella (1903) in their intellectual environment and interrelationship. GE credit: ArtHum, Wrt.

**\*117B. The Nibelungen Tradition: Medieval, Musical, and Modern (4) II.** McConnell  
Lecture—3 hours; term paper. Knowledge of German not required. Three modes of the Nibelungen legend: the Medieval epic poem *Nibelungenlied*, the Scandinavian *Volsunga Saga*, Wagner's music drama *Ring of the Nibelungen*, and Thomas Mann's *Blood of the Walsungs* in their intellectual environment and interrelationship. GE credit: ArtHum, Wrt.

**\*117C. Parzival Tradition: Medieval, Musical, Modern (4) III.** McConnell  
Lecture—3 hours; term paper. Three modes of the Parzival legend: the medieval epic, *Parzival*, Wagner's music drama *Parsifal* and Thomas Mann's *The Magic Mountain* in their intellectual environment and interrelationship. Knowledge of German not required. GE credit: ArtHum, Wrt.

**\*118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire) (4) I.** Menges  
Lecture—1 hour; discussion—2 hours; term paper. 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.

**\*118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4) III.** Menges  
Lecture—1 hour; discussion—2 hours; term paper. 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.

**\*118C. Germany Under the Third Reich (4) I.** Menges  
Lecture—1 hour; discussion—2 hours; term paper. Background in European history helpful. Interdisciplinary study of German politics, society, and culture during the Third Reich (1933-45). Historical, literary, psychological, philosophical readings; study of architecture, graphic arts, cinema; fascist aesthetic. Everyday life in Hitler's Germany: consent, dissent, opposition, and resistance; Jews in Germany; the Holocaust. GE credit: ArtHum, Wrt.

**\*118D. Germany Between 1949 and 1989:**

**Division and Restoration** (4) II. Menges  
Lecture/discussion—3 hours; term paper. Survey of German history as a divided country. Associated cultural phenomena such as the so-called Economic Miracle, the Student Movement, the Historian's Debate through a variety of theoretical and aesthetics texts and films. Offered in alternate years.

**\*118E. Contemporary German Culture** (4) II.

Menges  
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50. Thorough introduction into the political, economic, social and cultural scene of Germany today (Austria and Switzerland marginally included). Historical background and comparative perspectives. Readings from a variety of sources, films and videotapes. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

**118F. The German War Experience in**

**Literature, Art, Film, and Music** (4) I. McConnell  
Lecture—3 hours; extensive writing. Prerequisite: one of History 144B, 146A, 146B, 147B or 147C recommended. German experience of war in the 20th century as manifested in literature, art, film, and music. Reaction to both wars contrasted and compared in the area of aesthetics with particular attention to the psychology of war. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*119. From German Fiction to German Film** (4)

II. The Staff  
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 transfers. GE credit: ArtHum, Wrt.

**120. Survey of German Culture** (4) III. Bernd

Lecture—3 hours; discussion—1 hour. Prerequisite: course 22. Major developments in such areas of German life as the arts, philosophical thought, social institutions, and political history.

**121. The Medieval Period in German Literature**

(4) II. McConnell  
Discussion—3 hours; term paper. Prerequisite: course 22. Literary-philosophical profile of the *Mittelhochdeutsche Blütezeit* in terms of the significant epics, romances, and lyric poetry. Readings in modern German.

**\*122A. Humanism and Reformation** (4) I.

Schaeffer  
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Exemplary literary works of the sixteenth century tracing the principal lines of development and showing the reflection in literature of the social scene.

**\*122B. The Literary Baroque** (4) II. Schaeffer

Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Exemplary literary works of the seventeenth century tracing the principal lines of development and showing the reflection in literature of the social scene.

**123. Literature of the Classical Age** (4) I. Bernd

Discussion—3 hours; term paper. Prerequisite: course 22. A critical assessment of principal works of Goethe and Schiller in their development from *Sturm und Drang* individualism and rebellion to the balanced harmony of the classical period.

**\*124A-D. Major Movements in German**

**Literature** (4) I, II, III. The Staff  
Discussion—3 hours; term paper. Prerequisite: course 22 or the equivalent. Examination of significant movements and schools, with particular emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works: (A) *Sturm und Drang*; (B) *Romantik*; (C) *Naturalismus*; (D) *Expressionismus*.

**\*125. Short Fiction Around 1900** (4) III.

Schaeffer  
Lecture—3 hours; term paper. Prerequisite: course 22. Representative short German fiction in the fin-de-siècle period, to attain conversance with various prose styles and the cultural currents they reflect.

**\*126. Modern German Literature** (4) I. Menges  
Discussion—3 hours; term paper. Prerequisite: course 22. Selections from significant works of major twentieth-century writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated for credit with consent of Undergraduate Major Adviser.

**127A-G. Studies in Major Writers** (4) I. The Staff  
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 22 or the equivalent; course 120 recommended. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement in each case: (A) Lessing; (B) Goethe; (C) Kafka; (D) Rilke, George, and Hofmannsthal; (E) Brecht; (F) Schiller; (G) Kleist. Course presentation in German. May be repeated for credit when subject area differs.

**\*129. Postwar Women Writers** (4) III. Finney  
Discussion—3 hours; term paper. Prerequisite: course 22. Survey of major women writing in German since 1945. Considers such issues as the existence of "feminine writing" and of a feminist aesthetics. Writers include Seghers, Bachmann, Wolf, Kirsch, Morgner, Wohmann, Stefan, and Schwaiger.

**\*130. Modernity and its Discontents: The Tradition of German Cultural Critique** (4) I.

Menges  
Lecture—2 hours; discussion—1 hour; four short papers. Prerequisite: History 4B or 4C. Philosophical and aesthetic tradition of *Kulturkritik*, from Romanticism to present. Authors include Herder, Schiller, Novalis, Hegel, Marx, Nietzsche, Freud, Spengler, Klages, Heidegger, Gehlen, The Frankfurt School. Illustrations from landscape and city representations. Knowledge of German not required. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*131. German Lyric Poetry** (4) I. Schaeffer

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.

**\*132. The German Novelle** (4) I. Bernd  
Lecture—3 hours; written reports. 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.

**\*133. The German Drama** (4) III. Bernd

Lecture—3 hours; term paper. Prerequisite: course 22. Readings in the works of Germany's leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht.

**134. Topics in German Intellectual History** (4) I,

III. Schaeffer, Menges  
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated twice for credit when topic differs. Offered in alternate years.

**\*140. German Political Literature from the Middle Ages to the Present** (4) II. McConnell  
Lecture—3 hours; discussion—1 hour. Prerequisite: English 3 or 4 or French 25; course 51 recommended. Examination of the relationship of art to politics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformation, the period of Romanticism, and the Twentieth Century. GE credit: ArtHum, Wrt.

**141. The Holocaust and its Literary**

**Representation** (4) I. Menges  
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, Div, Wrt.

**\*142C. New German Cinema: From Oberhausen to the Present** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour. A survey of representative works of the most influential filmmakers of the New German Cinema: Alexander Kluge, Volker Schlöndorff, Rainer Werner Fassbinder, Werner

Herzog, Hans-Jürgen Syberberg, Wim Wenders, Margarethe von Trotta, Helke Sander, Helma Sanders-Brahms, and Jutta Brückner.

**143. Language Through Media** (4) II. Schaeffer  
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. 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. Discussion of contents, critical approaches, writing of summaries, rebuttals and comments. Offered alternate years.

**\*144. Marx, Nietzsche, Freud** (4) I. Finney  
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. Taught in English. Offered in alternate years.

**\*145. The Literature of Deviance: Mann, Hesse, Kafka** (4) II. Finney

Lecture/discussion—3 hours; term paper. Close study of selected prose works as representative of modernism's fascination with social, sexual, and psychological alienation. Attention to the nuanced portrayal of deviance through formal innovations in fiction. Taught in English. Offered in alternate years.

**\*150. Contemporary German Literature** (4) I.

Kuhn  
Discussion—3 hours; term paper. Prerequisite: course 103 or the equivalent. Readings in contemporary literature, including texts by Christa Wolf, Helga Königsdorf, Monika Maron, Günter Grass, Peter Schneider, Günter de Bruyn. Offered in alternate years.

**\*160. Love in the Middle Ages** (4) I. McConnell

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.

**\*165. The German Epigram** (4) I. Schaeffer  
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Survey of the German epigram from its beginnings to the present, tracing the origins and development of the genre, its place in European literature, and its function as a mirror of the history of ideas.

**166. Die Meistersinger** (4) III. Schaeffer  
Lecture/discussion—3 hours; listening—1 hour. Prerequisite: course 22. Wagner's music-drama *Die Meistersinger von Nürnberg* against the background of the city's cultural history, the practice of Meistersang and the historical Hans Sachs, to show the relationship of words to music, and the resulting music-drama as an eminently humanistic work. Offered in alternate years.

**\*167. Ribaldry in German Literature** (4) III.

Schaeffer  
Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Survey of German Literature from late Middle Ages to Age of Goethe, focusing on ribaldry, i.e., earthy humor close to everyday life, sometimes for its own sake, more often as social satire or the promotion of causes such as the Reformation. Offered in alternate years.

**\*168. Multiculturalism in German Literature** (4)

II. Schaeffer  
Lecture/discussion—3 hours; term paper/discussion—1 hour. Prerequisite: course 21 or consent of instructor. Examples of German literature in which "encounter with the other" is thematic. Going from the High Middle Ages to mid-20th century, these examples reflect contact with people of color, different beliefs and cultures and inner-German minorities. Offered in alternate years.

**185. The Age of Bismarck** (4) II. Bernd  
Discussion—3 hours; term paper. Prerequisite: course 22. Study of notable literary repercussions that took place when Germany's international status reached its peak during the age of the Iron Chancellor. The poetry of Storm, the prose of Fontane, the drama of Hauptmann.



**192. Field Work in German** (1-12) I, II, III. Henderson

Internship—3-36 hours. Prerequisite: course 109A. Internship with several German companies. Participation in various business activities where expertise in German is expected and further developed. (P/NP grading only.)

**194HA-194HB. Honors Program** (3-3) I-II.

The Staff (Chairperson in charge)

Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.5 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 German** (2-4) I. Henderson

Lecture—2-4 hours; term paper. Prerequisite: course 22. Tutoring and leading of special discussion sections in first-year language classes. Offers teaching opportunities under guidance of staff after initial observation period. Exposes course participants to all phases of language teaching; instant feedback and discussion. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****\*202. Middle High German** (4) II. McConnell

Discussion—3 hours; lecture—1 hour. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.

**210. Techniques of Literary Scholarship** (4) I.

The Staff

Seminar—3 hours; term paper. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.

**\*211. Concepts in Literary Theory** (4) II. Menges

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.

**\*212. Contemporary Approaches to Literary Theory** (4) III. Finney

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.

**\*239. Narrative and Narrative Theory** (4) I.

Finney

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.

**\*240. Forms of German Verse** (4) II. Bernd

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.

**\*241. The German Drama** (4) I. Finney

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.

**\*242. The German *Novelle*** (4) II. Bernd

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.

**\*243. Fontane and the Rise of the Modern German Novel** (4) II. Bernd

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.

**\*244. Gender and Comedy** (4) III. Finney

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.

**\*252. The Writings of Lessing** (4) I. The Staff

Seminar—3 hours; term paper. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.

**\*253. Goethe** (4) I. Bernd

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.

**\*254. Schiller** (4) III. The Staff

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.

**\*255. Aesthetics in the Age of Goethe** (4) I.

Menges

Seminar—3 hours; term paper. Prerequisite: German 200A, 200B, 200C. Focuses on the emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. This involves 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.

**\*257. Heinrich von Kleist** (4) III. Bernd

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.

**\*258. The Novels of Thomas Mann** (4) II.

Menges

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.

**\*259. Studies in Kafka** (4) II. The Staff

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.

**\*260. The Poetry of Rilke** (4) I. Menges

Seminar—3 hours; term paper. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke.

**\*261. Brecht and the Epic Theater** (4) III.

Menges

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.

**262. Studies in Turn-of-the-Century Culture** (4)

II. Finney

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.

**270A. Research in a Period or Topic** (4) I, II, III.

The Staff (Chairperson in charge)

Discussion—1 hour; term paper. Individually guided research, under the supervision of a faculty member, in the specialized study of a period or problem that holds promise of yielding dissertation topics, culminating in a term paper. Recommended for Ph.D. candidates prior to the Qualifying Examination.

**270B. Basic Research for the Dissertation** (4) I, II, III. The Staff (Chairperson in charge)

Individual instruction from a faculty member—1 hour. Prerequisite: course 270A. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

**270C. Basic Research for the Dissertation** (4) I, II, III. The Staff (Chairperson in charge)

Individual instruction from a faculty member—1 hour. Prerequisite: course 270B. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

**\*285. Middle High German Literature** (4) III.

McConnell

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.

**288. The Renaissance and Reformation in German Literature** (4) I. Schaeffer

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.

**\*289. German Literature of the Baroque** (4) I.

Schaeffer

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.

**290. The Enlightenment in German Literature**

(4) I. The Staff

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.

**\*292. Sentimentality and *Sturm und Drang* in German Literature** (4) III. Menges

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.

**\*293. The Classical Age of German Literature**

(4) III. Bernd

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.

**\*294. The Romantic Period in German Literature** (4) I. Menges

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.

**\*295. Poetic Realism in German Literature** (4) I.

Bernd

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.

**296. Twentieth-Century German Literature** (4) I.

Kuhn

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.

**297. Special Topics in German Literature** (4) I, II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Special Study for the Doctoral Dissertation** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Courses**

**\*390A. The Teaching of German** (2) I.

Henderson  
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.)

**\*390B. The Teaching of German** (2) II.

Henderson  
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.)

**\*390C. The Teaching of German** (2) III.

Henderson  
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.)

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Professional Course**

**400. Tutorial and Instructional Internship** (1-3)

I, II, III. The Staff (Chairperson in charge)  
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.

Joan Cadden, Ph.D., Professor  
Steven Deyle, Ph.D., Assistant Professor  
William W. Hagen, Ph.D., Professor  
Karen Halttunen, Ph.D., Professor  
Deborah E. Harkness, Ph.D., Assistant Professor  
Kyu H. Kim, Ph.D., Assistant Professor  
Catherine J. Kudlick, Ph.D., Associate Professor  
Norma B. Landau, Ph.D., Professor  
Susan L. Mann, Ph.D., Professor  
Ted W. Margadant, Ph.D., Professor  
Barbara Metcalf, Ph.D., Professor  
Lorena Oropeza, Ph.D., Assistant Professor  
Don C. Price, Ph.D., Professor  
Ruth E. Rosen, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Michael Saler, Ph.D., Assistant Professor  
Michael L. Smith, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Stylianios Spyridakis, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Kathleen Stuart, Ph.D., Assistant Professor  
Alan S. Taylor, Ph.D., Professor  
Krystyna Von Henneberg, Ph.D., Assistant Professor  
Charles Walker, Ph.D., Assistant Professor  
Clarence E. Walker, Ph.D., Professor

**Emeriti Faculty**

William M. Bowsky, Ph.D., Professor Emeritus  
David Brody, Ph.D., Professor Emeritus  
Daniel H. Calhoun, Ph.D., Professor Emeritus  
Robert O. Crumme, Ph.D., Professor Emeritus  
Manfred P. Fleischer, Ph.D., Professor Emeritus  
W. Turrentine Jackson, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
David L. Jacobson, Ph.D., Professor Emeritus  
Kwang-Ching Liu, Ph.D., Professor Emeritus  
Rollie E. Poppino, Ph.D., Professor Emeritus  
Morton Rothstein, Ph.D., Professor Emeritus  
Richard N. Schwab, Ph.D., Professor Emeritus  
Morgan B. Sherwood, 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:**

**Preparatory Subject Matter (Plan I or II).....20**

Five lower division courses, including at least two from each of two of the following fields.....20

- (a) *Western Civilization:* History 3, 4A, 4B, 4C, 10, 30
- (b) *Asian Civilization:* History 8, 9A, 9B
- (c) *United States and Latin America:* History 17A, 17B, 72A, 72B, 85, 86
- (d) *Africa:* History 15

\*Course not offered this academic year.

**Depth Subject Matter—Plan I.....40-41**

Four upper division courses from one of the fields of concentration listed below .....16  
Three upper division courses from one of the other fields of concentration listed below .....12  
Two upper division courses from a field or fields other than those chosen to satisfy the two preceding requirements .....8  
One course from the following: History 101 or 102 or 103 (in field of concentration) ...4-5

**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

**Total Units for the Major, Plan II.....62**

**Fields of Concentration**

- a. *Pre-Industrial Europe:* History 102A, 102B, 102C, 102D, 102P, 111A, 111B, 111C, 121A, 121B, 121C, 122, 125, 130A, 130B, 130C, 131A, 131B, 131C, 133, 135A, 136, 139A, 144A, 148A, 151A, 151B.
- b. *Modern Europe:* History 102E, 102F, 102I, 134A, 135B, 138A, 138B, 138C, 139B, 141, 142, 143, 144B, 145, 146A, 146B, 147A, 147B, 147C, 148B, 151C, 151D.
- c. *United States History:* History 102K, 102L, 102M, 169A, 169B, 170A, 170B, 170C, 171, 173, 174A, 174B, 174C, 174D, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 178, 180A, 180B, 180C, 181, 183A, 183B, 185A, 185B, 187A, 187B, 188A, 188B, 189A, 189B, 189C.
- d. *Asian History:* History 102G, 102H, 102N, 102Q, 102R, 110, 191A, 191B, 191C, 191D, 191E, 191F, 194A, 194B, 194C, 194D, 194E, 196A, 196B.
- e. *African History:* History 102O, 110, 115A, 115B, 115C, 116.
- f. *Latin American History:* History 102J, 110, 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168, 169A, 169B.
- g. 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.** L. Barber, C.L. Brantley, S. Deyle, D. Harkness, K. Kim, C.J. Kudlick, L. Oropeza, D. Price, R.E. Rosen, M. Saler, M. Smith, S. Spyridakis, K. Stuart, Ch. Walker.

**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, 86, 135A, 135B, 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.

**Greek**

See Classics

**Hebrew**

See Religious Studies

**History**

(College of Letters and Science)

Ted W. Margadant, Ph.D., Chairperson of the Department

Department Office, 2216 Social Sciences and Humanities Building (530-752-0776)

World Wide Web: <http://trc.ucdavis.edu/departments/history/newhist.html>

**Faculty**

Lucy Barber, Ph.D., Assistant Professor  
Arnold J. Bauer, Ph.D., Professor  
Robert Borgen, Ph.D., Professor  
Beverly Bossler, Ph.D., Associate Professor  
Cynthia L. Brantley, Ph.D., Associate Professor  
Daniel R. Brower, Jr., Ph.D., Professor

## 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 .....

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 3.5) and course requirements established by the College of Letters and Science. To qualify for History honors, high or highest honors, students must also complete the History Department honors program with a GPA of 3.5 or above and write a thesis that meets the criteria for honors, 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, interviews, and faculty recommendations. Students admitted to the program must complete the History 104A, 104B, 104C sequence of honors courses, which demands 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 (undergraduate seminar) before the end of their junior year. When applying for admission to the honors program, a student should indicate the research project he or she intends to pursue and should consult with a faculty member about the project. Students may follow either Plan I or Plan II described above, and may substitute History 104 in their program (though they may not substitute it for 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 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 by the Office of the Registrar, (b) the course should be considered upper division by the standards set forth by the Education Abroad Program, (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 also the section on the Teacher Education Program.

**Waiver Program for Single-Subject Teaching Credential in History.** The Department of History offers a program of study for students seeking a secondary teaching credential in history. The program can be accommodated within the requirements for the major in History, but does require some specific course work. A list of current course requirements is available in the Advising Office, Division of Education, 174 Kerr Hall.

**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.** A.J. Bauer, B. Bossler, J. Cad-den, W. Hagen, K. Haltunen, A. Taylor, C.E. Walker.

**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, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 180A, 180B, 183A, 183B. 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 Western Civilization (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Survey of western civilization, focusing on nine cities, at the period of their greatest creativity: Athens, Rome, Constantinople, Paris, Florence, Amsterdam, London, Berlin, Moscow. Illustrated with slides, music, and optional films. GE credit: ArtHum.

**4A. History of Western Civilization (4) I.**

The Staff

Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. GE credit: ArtHum, Wrt.

**4B. History of Western Civilization (4) I, II, III.**

Harkness, Landau, Stuart

Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. GE credit: ArtHum, Wrt.

**4C. History of Western Civilization (4) I, II.**

Kudlick, Margadant, Saler

Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. GE credit: ArtHum, Wrt.

**8. History of Indian Civilization (4) III.** Metcalf

Margadant, Saler

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.

**9A. History of East Asian Civilization (4) II, III.**

Bossler, Mann, Price

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.

**9B. History of East Asian Civilization (4) I.**

Borgen, Kim

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.

**10C. World History III (4) III.** The Staff

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.

**15. Introduction to African History (4) I.**

Brantley

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.

**17A. History of the United States (4) I, II.**

Haltunen, Taylor

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.

**17B. History of the United States (4) II, III.**

Barber

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.

**\*25. Thematic History Seminar (4)** The Staff

Seminar—3 hours; term paper. Prerequisite: freshman or sophomore standing. Explores in-depth a historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretations.

**\*30. Russian Cultural History (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Survey of Russia's history over the last thousand years as reflected in the lives of her political leaders, artists, and rebels. Lectures will use the biographies of Russian political leaders, intellectuals and artists to illustrate the general currents of the country's political, social, and cultural development. GE credit: ArtHum.

**72A. Social History of American Women and the Family (4) I.** The Staff

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.

**72B. Social History of American Women and the Family (4) II.** Rosen

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.

**\*85. Nature, Man, and the Machine in America (4)** Smith

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.

**\*86. Quackery and Pseudoscience in America (4)** The Staff

Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in America: witchcraft, medical quackery, spiritualism, science hoaxes, technological frauds, literary and artistic forgeries, UFOs, pyramidology, astrology, psychic phenomena. Emphasis upon explanations for the existence of deception and pseudoscience.

**98. Directed Group Study (1-5)** The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

**\*101. Introduction to Historical Thought and Writing (5) III.** Landau

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.

**102A-R, X. Undergraduate Proseminar in History (5) I, II, III.** The Staff

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; (C) Renaissance and Reformation; (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; (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.

**103. Topics in Historical Research** (4) The Staff (Chairperson in charge)

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) I. Brower

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 methodologies 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.

**104B. Honors Tutorial** (4) II. The Staff  
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.)

**104C. Honors Tutorial** (4) III. The Staff  
Tutorial—4 hours. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser.

**\*110. Themes in World History** (4) The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; at least 8 units in history. Issues in world history from 1400 to the present. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. Offered in alternate years. GE credit: ArtHum.

**\*111A. Ancient History** (4) II. Spyridakis  
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.

**111B. Ancient History** (4) III. Spyridakis  
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.

**111C. Ancient History** (4) II. Spyridakis  
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.

**\*112A. Topics in Pre-Modern Jewish History** (4) I. The Staff

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 (eg., medieval Jewry) or thematically (eg., trade and Jewish communities). May be repeated once for credit. GE credit: ArtHum, Div, Wrt.

**112B. Topics in Modern Jewish History** (4) III. The Staff

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 (eg. Zionism, assimilation, the post Holocaust Diaspora). May be repeated once for credit. GE credit: ArtHum, Div, Wrt.

**\*115A. History of West Africa** (4) I. Brantley  
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 4C recommended. Introductory survey of the history of West Africa and the Congo region from the earliest times to the present. GE credit: ArtHum, Div, Wrt.

**115B. History of East and Central Africa** (4) II. Brantley

Lecture—3 hours; written reports. Prerequisite: course 115A recommended. Introductory survey of the history of east and central Africa from 1000 to the present. This course is a part of an interdisciplinary East African sequence which includes History 115B (winter) and Political Science 138. GE credit: ArtHum, Div, Wrt.

**115C. History of Southern Africa, Swaziland, Lesotho, and Botswana from 1500 to the Present** (4) II. Brantley

Lecture—3 hours; written reports. Prerequisite: courses 115A and 115B recommended. Introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1500 to the present. GE credit: ArtHum, Div, Wrt.

**\*116. African History: Special Themes** (4) Brantley

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) I. The Staff  
Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: ArtHum, Wrt.

**\*121B. Medieval History** (4) III. The Staff  
Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century. GE credit: ArtHum, Wrt.

**121C. Medieval History** (4) I. Cadden  
Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance. GE credit: ArtHum, Wrt.

**122. Selected Themes in Medieval History** (4) III. Cadden

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.

**125. Topics in Early Modern European History** (4) III. Harkness

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, Ancien Regime France, family and sexuality, and material culture and daily life. May be repeated for credit. GE credit: ArtHum, Wrt.

**\*130A. Christianity and Culture in Europe: 50-1450** (4) II. The Staff

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.

**\*130B. Christianity and Culture in Europe: 1450-1600** (4) II. The Staff

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.

**\*130C. Christianity and Culture in Europe: 1600-1850** (4) The Staff

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) Stuart

Lecture—3 hours; written reports. Prerequisite: courses 4A and 4B recommended. Western Euro-

pean history from about 1350 to about 1500. GE credit: ArtHum.

**\*131B. European History During the Renaissance and Reformation** (4) II. Stuart

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.

**131C. The Old Regime: Absolution, Enlightenment and Revolution in Europe** (4) II. Stuart

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.

**132. Crime and Punishment in Early Modern Europe** (4) II. Stuart

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.

**\*133. The Age of Ideas** (4) The Staff

Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century. GE credit: ArtHum.

**\*134A. The Age of Revolution** (4) I. The Staff

Lecture—3 hours; written reports. Ideas and institutions during the French Revolution and the Napoleonic era. GE credit: ArtHum.

**\*135A. History of Science to the 18th Century** (4) Cadden, Harkness

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.

**\*135B. History of Science, 18th to 20th Centuries** (4) I. Harkness

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.

**136. Scientific Revolution** (4) III. Harkness

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, Versalini, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. GE credit: ArtHum, Wrt.

**138A. Russian History: The Rise of the First Empire, 1500-1881** (4) II. Brower

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.

**138B. Russian History: The Russian Revolution, 1880-1917** (4) I. Brower

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.

**\*138C. Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present** (4) III.

Brower

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.

**\*139A. Medieval and Renaissance Medicine** (4) Cadden

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) III. Kudlick

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.

**\*140. The Rise of Capitalism in Europe** (4) III. Hagen

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.

**141. France Since 1815** (4) II. Margadant

Lecture—3 hours; term paper. GE credit: ArtHum, Wrt.

**142. Why the Holocaust?** (4) II. The Staff

Lecture—3 hours; term paper. Long- and short-term causes of the Holocaust; the emancipation of European Jewry; the rise of modern antisemitism; nationality question in central Europe; antisemitism and German politics; Nazism and mass murder; responses by victims and bystanders. GE credit: ArtHum, Div.

**143. History of Eastern Europe and the Balkans** (4) II. Hagen

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.

**144A. History of Germany, 1450 to 1789** (4) III. Cadden

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.

**\*144B. History of Germany since 1789** (4) II. Hagen

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.

**145. War and Revolution in Europe, 1789-1918** (4) III. Margadant

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.

**146A. Europe in the Twentieth Century** (4) II. von Henneberg

Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939. GE credit: ArtHum, Wrt.

**146B. Europe in the Twentieth Century** (4) III. von Henneberg

Lecture—3 hours; term paper. Survey of the history of Europe since 1939. GE credit: ArtHum, Wrt.

**\*147A. European Intellectual History, 1800-1870** (4) II. Saler

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.

**147B. European Intellectual History, 1870-1920** (4) II. Saler

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.

**147C. European Intellectual History, 1920-1970** (4) III. Saler

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.

**148A. Women and Society in Europe: 1500-1789** (4) II. Hagen

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.

**148B. Women and Society in Europe: 1789-1920** (4) II. Kudlick

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.

**148C. Women and Society in Europe: 1914-Present** (4) III. The Staff

Lecture—3 hours; term paper. Prerequisite: course 148C 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.

**149. Comparative Cultural History of Modern Britain and France, 1880-1914** (4) II. Kudlick, Saler

Lecture—3 hours; term paper. Cultural comparison of the histories of Britain and France during the fin de siècle. 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.

**151A. England: The Middle Ages** (4) III. The Staff

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.

**\*151B. England: The Early Modern Centuries** (4) The Staff

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) I. Landau

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.

**\*151D. Industrial England** (4) Landau

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.

**161A. History of Colonial Spanish America** (4) I. Bauer

Lecture/discussion—3 hours; written reports. Pre-Columbian civilizations of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides. GE credit: ArtHum, Div, Wrt.

**161B. Latin American History** (4) II. Bauer, C. Walker

Lecture/discussion—3 hours; written reports. Evolution of modern Latin America: export economies; oligarchic rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides. GE credit: ArtHum, Div, Wrt.

**162. History of the Andean Region** (4) III. C. Walker

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.

**\*163A. History of Brazil** (4) III. The Staff

Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in alternate years. GE credit: ArtHum.

**\*163B. History of Brazil** (4) III. The Staff

Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in alternate years. GE credit: ArtHum.

**164. History of Chile** (4) III. Bauer

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.

**\*165. Latin American Social Revolutions** (4) II. Bauer

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.

**\*166A. History of Mexico to 1848** (4) III. Bauer

Lecture/discussion—3 hours; written and/or oral reports. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. Offered in alternate years. GE credit: ArtHum.

**\*166B. History of Mexico Since 1848** (4) I. The Staff

Lecture/discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in alternate years. GE credit: ArtHum.

**\*168. History of Inter-American Relations** (4) III. The Staff

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.

**169A. Mexican-American History** (4) II. Oropeza  
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.

**169B. Mexican-American History** (4) I. Oropeza  
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.

**\*170A. Colonial America** (4) Taylor

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.

**\*170B. The American Revolution** (4) Taylor

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.

**170C. The Early National Period, 1789-1815** (4) III. Deyle

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.

**171A. The Jacksonian Era** (4) II. Deyle

Lecture—3 hours. Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850. GE credit: ArtHum, Div, Wrt.

**171B. U.S. Civil War: Politics and Society** (4) III. Deyle

Lecture/discussion—3 hours; term paper. Social crisis, 1848-1877: slavery and the West, new political parties, secession, mobilization and emancipation, economic nationalism and Reconstruction (for military aspects, see course 173). GE credit: ArtHum.

**171BF. The Civil War in American Film** (1) II, III. Deyle

Discussion—1 hour; film viewing. Prerequisite: course 171B concurrently. Viewing and discussion of films with short writing assignments. (P/NP grading only.)

**173. Becoming an American: Immigration and American Culture** (4) III. Rosen

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.

**174A. The Emergence of Modern America, 1876-1914** (4) II. Barber

Lecture—3 hours; term paper. Rise of modern business and labor organizations, changing political institutions, the culmination and decline of Victorian culture, and the reaction of muckrakers, Populists, socialists, feminists and social reformers to industrialization and urbanization. GE credit: ArtHum, Div, Wrt.

**174AD. Emergence of Modern America: Discussion** (1) I. Barber

Discussion—1 hour; short papers. Prerequisite: course 174A concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.)

**174B. America in War, Prosperity and Depression, 1914-1945** (4) II. The Staff

Lecture—3 hours; term paper. America's emergence as a world power, the business culture of 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. GE credit: ArtHum, Wrt.

**174BD. America in War, Prosperity and Depression: Discussion** (1) II. The Staff

Discussion—1 hour; short papers. Prerequisite: course 174B concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.)

**174C. The United States Since World War II, 1945 to the Present** (4) III. Smith

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.

**174CD. The United States Since World War II: Discussion** (1) III. Smith

Discussion—1 hour; short papers. Prerequisite: course 174C concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.)

**174D. Selected Themes in 20th Century American History** (4) II. The Staff

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 once for credit when topic differs. Offered in alternate years. GE credit: ArtHum.

**174DD. Selected Themes in 20th Century American History: Discussion** (1) I, II, III. The Staff

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.)

**\*175A. Intellectual History of the United States** (4) The Staff

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American thought from the Puritans through the era of the American Enlightenment.

**\*175B. Intellectual History of the United States** (4) The Staff

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820s to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

**\*175C. Intellectual History of the United States** (4) The Staff

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Twentieth-century American thought from about 1900 to the 1960s, emphasizing pragmatic liberalism, naturalism in law and literature, protestant liberalism and neo-orthodoxy, Freudian currents in social thought and social criticism of the 1960s.

**176A. Cultural and Social History of the United States** (4) I. Halltunen

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.

**\*176B. Cultural and Social History of the United States** (4) III. Halltunen

Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth cen-

tury with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ArtHum.

**177A. History of Black People and American Race Relations** (4) I. C.E. Walker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 17A or 17B. History of black people in the United States from the African background to Reconstruction. GE credit: ArtHum, Div, Wrt.

**\*177B. History of Black People and American Race Relations** (4) C.E. Walker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 17A or 17B. History of black people in the United States from the African background to Reconstruction. GE credit: ArtHum, Div, Wrt.

**\*178. Race in America** (5) II. C.E. Walker

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 17B, 177A, 177B recommended. Examination of the idea of race and how it has shaped American history and the interaction of blacks, whites, Latins, and Asians in the United States. (Offered in alternate years.) GE: ArtHum, Div, Wrt.

**\*180A. Growth of American Politics to 1815** (4) The Staff

Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to 1815 focusing on the distribution of power, its change over time and the ways power has been used. Examines political party development and the social and ideological dimensions of political behavior. GE credit: ArtHum.

**\*180B. Growth of American Politics, 1815-1890** (4) III. The Staff

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A. GE credit: ArtHum.

**\*180C. Growth of American Politics, 1890 to the Present** (4) The Staff

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B. GE credit: ArtHum.

**\*181. Religion in American History to 1900** (4) The Staff

Lecture—2 hours; discussion—1 hour; oral and written reports. Religious ideas and institutions from the Puritans to about 1900. Survey of the large-scale social changes associated with revivalism and the great awakenings and the movement from Protestant orthodoxy to pluralism in industrial America.

**\*183A. The Frontier Experience: Trans-Mississippi West** (4) I. Taylor

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.

**\*183B. The Frontier Experience: Trans-Mississippi West** (4) II. Taylor

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.

**\*185A. History of Science in America** (4) The Staff

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) Smith

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.



**\*187A. American Business History to the 1880s** (4) The Staff

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1880s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

**\*187B. American Business History, 1880s to the Present** (4) The Staff

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1880s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

**\*188A. History of Agriculture in the U.S. to 1900** (4) The Staff

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economic and social institutions. Offered in alternate years.

**\*188B. History of Agriculture in the U.S. Since 1900** (4) II. The Staff

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in alternate years.

**\*189A. History of California** (4) The Staff

Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War. GE credit: ArtHum.

**\*189B. History of California** (4) The Staff

Lecture—3 hours; written and/or oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilantes; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform. GE credit: ArtHum.

**\*189C. History of California** (4) The Staff

Lecture—3 hours; written and/or oral reports. Impact of World War I; conservative reaction of the 1920s; rise of organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics. GE credit: ArtHum, Wrt.

**\*191A. Classical China** (4) I, II. Price

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.

**191B. High Imperial China** (4) II. Bossler

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.

**191C. Late Imperial China** (4) I. Mann

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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**191D. Nineteenth Century China: The Empire Confronts the West** (4) I. Bossler

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.

**191E. The Chinese Revolution** (4) II. Price

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.

**191F. History of the People's Republic of China** (4) III. Mann

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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**192. Internship in History** (1-12) I, II, III.

The Staff (Chairperson in charge)  
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.)

**\*194A. Aristocratic and Feudal Japan** (4) II.

Borgen  
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.

**194B. Early Modern Japan** (4) I. Kim

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.

**194C. Modern Japan** (4) III. Kim

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.

**\*194D. Business and Labor in Modern Japan** (4) I. The Staff

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.

**\*194E. Education and Technology in Modern Japan** (4) I. The Staff

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.

**\*196A. Medieval India** (4) I. Metcalf

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.

**\*196B. Modern India** (4) Metcalf

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.

**\*197T. Tutoring in History** (2) The Staff (Chairperson in charge)

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 once for credit. No final examination. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor; upper division standing. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****201A-T, X. Sources and General Literature of History** (4) I, II, III. The Staff

Seminar—3 hours; term paper. 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; (Q) Cross-Cultural Women's History; (S) History of Science and Medicine; (T) Jewish History; (X) World History. May be repeated for credit when different subject area is studied.

**202A-K. Major Issues in Historical Interpretation** (4) I, II, III. The Staff

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; (K) Britain. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.

**203. Seminar Research** (4) II. The Staff (Chairperson in charge)

Seminar—3 hours. Prerequisite: consent of instructor. Designed primarily for students preparing for higher degrees in History. Individual research and analysis resulting in substantial research paper. May be repeated for credit.

**204. Historiography** (4) I. Haltunen

Seminar—3 hours; term paper. Major issues in the philosophy and methodology of history.

**\*211. Ancient History** (4) Spyridakis

Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. Seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

**\*221. Medieval History** (4) The Staff

Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

**\*237. Russian History** (4) Brower

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856.

**245. Modern European History** (4) III. Margadant  
Seminar—3 hours. Prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.

**\*261. Latin American History** (4) I, II, III. Bauer  
Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

**271A-271B. United States History** (4-4) II-III.

The Staff  
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.)

**\*273A-273B. Research Seminar in the Comparative History of Women and the Family** (4-4) I-II. Rosen

Seminar—3 hours; paper. Research in literature, methods, and historical approaches to the area of

women and the family culminating in each student completing a research paper in this field. (Deferred grading only, pending completion of sequence.)

**\*291A. Chinese History** (4) Price, Mann, Bossler 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.)

**\*291B. Chinese History** (4) Price, Mann, Bossler 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.)

**291C. Chinese History** (4) Price, Mann, Bossler Seminar—2 hours; tutorial—1 hour. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the use of Chinese reference works. May be repeated once for credit.

**\*292. College Teaching Internship** (4) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

### Professional Courses

**\*300. Teaching History in the Community College** (3) I. The Staff

Discussion/laboratory—3 hours. Prerequisite: graduate standing. Designed for MAT students. Methods for the presentation of history at the community college and secondary school level. (S/U grading only.)

**389. Introductory Seminar for Teaching Assistants** (1) I, II, III. The Staff (Chairperson in charge)  
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.)

**390. Teaching History in College** (2) I, II, III. The Staff

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.)

## History and Philosophy of Science

(College of Letters and Science)

Paul Teller, Ph.D., Program Director

Program Office, 106 Sproul Hall (530-752-9621)

World Wide Web: <http://hpslab.ucdavis.edu>

### Committee in Charge

Joan Cadden, Ph.D. (*History*)

Michael R. Dietrich, Ph.D. (*History and Philosophy of Science*)

James R. Griesemer, Ph.D. (*Philosophy*)

Deborah E. Harkness, Ph.D. (*History*)

Kevin D. Hoover, D.Phil. (*Economics*)

Catherine J. Kudlick, Ph.D. (*History*)

Jay E. Mechling, Ph.D. (*American Studies*)

Benjamin S. Orlove, Ph.D. (*Environmental Science and Policy*)

Michael Smith, Ph.D. (*History*)

John H. Stanfield, II, Ph.D. (*African American and African Studies, Sociology*)

Paul Teller, Ph.D. (*Philosophy*)

### 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 the History and Philosophy of Science.

#### UNITS

**History and Philosophy of Science** .....24

Philosophy 104 .....4

History 135A or 135B .....4

Four courses from those listed below. One

course must be from each of three areas:

(a) history, (b) philosophy, and (c) history

and philosophy of science .....16

(a) History 102, 136, 139A, 139B, 185A,

185B, 188A, 188B;

(b) Philosophy 106, 107, 108, 109, 110,

111;

(c) History and Philosophy of Science

20, 130A, 130B, 150, 180.

**Minor adviser.** M. Dietrich, 234 Social Sciences and Humanities Building, 530-752-3709.

### Courses in History and Philosophy of Science (HPS)

#### Lower Division Courses

**\*20. Cosmic Origins and Structures: Scientific and Non-Scientific Theories** (4) II. The Staff  
Lecture/discussion—3 hours; term paper. Broad cultural survey of cosmogonies and cosmologies from several societies. Non-technical study of developments in Western culture that produced the cosmologies of Plato, Newton, and Einstein; also cosmological schemes of astrologers, alchemists, Christian mystics, women, and Native Americans.

**\*90X. Lower Division Seminar** (1-2) I, II, III.

The Staff (Chairperson in charge)  
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in History and Philosophy of Science through shared readings, discussions, written assignments, or special activities such as films, library work, archival work, etc. May be repeated once for credit when content differs. Limited enrollment.

#### Upper Division Courses

**\*130A. From Natural History to the History of Nature** (4) I. The Staff

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) III.

The Staff  
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 specialties 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) III. Dietrich

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.

**\*150. Gender and Science** (4) I. Dietrich  
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.

**180. Topics in History and Philosophy of Science and Technology** (4) II. Harkness  
Seminar—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or other course work relevant to the particular topic offering. 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, scientific explanation, technology and culture, theory testing.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**\*250. History and Philosophy of Science** (4) III. Dietrich  
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) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

#### Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Honors Challenge

Kenneth L. Verosub, Ph.D., Program Director  
Program Office, 162 Kerr Hall (530-752-9797)

### Honors Council

Will Benware, Ph.D. (*Linguistics*)

Amy M. Clarke, Ph.D. (*English*)

Louis E. Grivetti, Ph.D. (*Nutrition*)

James A. Harding, Ph.D. (*Environmental Horticulture*)

Kenneth I. Joy, Ph.D. (*Computer Science*)

Nora A. McGuinness, Ph.D. (*Integrated Studies*)

Ahmet N. Palazoglu, Ph.D. (*Chemical Engineering and Materials Science*)

Kenneth L. Verosub, Ph.D., Chairperson (*Geology*)

### 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 in the following year. At the lower division level, DHC participants take two honors courses or sections and one problem-oriented, interdisciplinary seminar per academic year. Students who successfully complete the program receive transcript notation.

Lower division departmental Honors courses, special DHC sections of regular courses, DHC seminars, and special studies opportunities constitute the course

offerings of the 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 communication skills, enhance research skills, provide experience with group dynamics and collaborative exploration of problems, and develop familiarity with electronic communication and visual presentations. Enrollment in each seminar is limited to 20 students. In 1998-99, approximately 200 first-year and 160 second-year students will be admitted to the Program. In addition, a limited number of third-year students will be admitted to an upper division honors pilot program.

**Students not admitted to the Program may not register for Davis Honors Challenge sections, seminars, or special study opportunities.**

Integrated Studies is an invitational first-year honors residential program associated with the Davis Honors Challenge. For information, see "Integrated Studies."

## Courses in Davis Honors Challenge (HNR)

### Lower Division Courses

**90X. Honors Discussion Section** (1) I, II, III. The Staff (Director in Charge)

Discussion—1 hour. Prerequisite: open only to student 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) I, II, III. The Staff (Director in Charge)

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) I, II, III. The Staff (Director in Charge)

Seminar—4 hours. Prerequisite: open only to students in the Davis Honors Challenge. Collaborative, multi-disciplinary 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) I, II, III. The Staff (Director in Charge)

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) I, II, III. The Staff (Director in charge)

Independent study—1-5 hours. Prerequisite: student in the Davis Honors Challenge. (P/NP grading only.)

### Upper Division Courses

**190X. Honors Contract** (1) I, II, III. The Staff (Director in Charge)

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) I, II, III. The Staff (Director in Charge)

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) I, II, III. The Staff (Director in Charge)

Seminar—3 hours. Prerequisite: open only to students in the Davis Honors Challenge. Collaborative exploration of a major scholarly topic from related disciplinary perspectives. Focus on critical thinking and analytical interpretation, on oral and written communication and on modern methods of scholarly research. May be repeated for credit. GE credit: Wrt.

**195. Honors Thesis** (1-3) I, II, III. The Staff (Director in Charge)

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 writing of a senior thesis. May be repeated for credit up to 9 units.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Director in Charge)

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) I, II, III. The Staff (Director in Charge)

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 (A Graduate Group)

M. Andrew Walker, Ph.D., Chairperson of the Group  
Group Office, 140 Environmental Horticulture  
(530-752-7738)

World Wide Web:  
<http://envhort.ucdavis.edu/HGG/HORTGG.htm>

**Faculty.** The faculty includes departmental members of Environmental Design, Environmental Horticulture, Entomology, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

**Graduate Study.** The Graduate Group in Horticulture offers programs of study leading to the M.S. degree. The programs provide opportunities for specialized study of the production, management, and utilization of horticultural plants and the postharvest handling of horticultural commodities. Areas of specialization include floriculture, nursery production, landscape horticulture, pomology, vegetable crops, and viticulture. Research may be conducted on an applied or basic problem having a physiological, genetic, or ecological emphasis.

**Preparation.** A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, genetics and introductory plant physiology. 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 and may be obtained from the Group Office.

**Graduate Advisers.** Consult the Group Office.

## Courses in Horticulture (HRT)

### Graduate Courses

**203. Research Perspectives in Horticulture** (3) I. Weinbaum (Pomology), DeJong (Pomology)

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. Not open for credit to students who have taken Pomology 203. Offered in alternate years.

**251. Modeling Horticultural Systems** (3) II. Lieth (Environmental Horticulture)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Biology 142, calculus, or consent of instructor. Introduces students to systems modeling. Primary emphasis on physiological and ecological models with examples drawn from areas of interest to class participants. Applications to horticultural systems will be explored. Students will receive hands-on experience.

**290. Seminar** (1) I, II, III. The Staff  
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.)

## Human Anatomy

See Cell Biology and Human Anatomy (in Medicine, School of)

## Human and Community Development

(College of Agricultural and Environmental Sciences)  
Lawrence V. Harper, Ph.D., Chairperson of the Department

Stephen B. Brush, Ph.D., Associate Chairperson of the Department

Department Advising Office, 1303 Hart Hall  
(530-752-2244)

Community Studies and Development, Human Development and Family Studies, and International Agricultural Development  
(530-752-0770)

World Wide Web:  
<http://hcd.ucdavis.edu/caes/hcd/default.html>

### Faculty—Community Studies and Development

Ted Bradshaw, Ph.D., Assistant Professor  
Stephen B. Brush, Ph.D., Professor  
Luis E. Guarnizo, Ph.D., Assistant Professor  
Frank Hirtz, Ph.D., Assistant Professor  
Martin F. Kenney, Ph.D., Professor  
Janet Momsen, Ph.D., Professor  
Michael P. Smith, Ph.D., Professor  
Miriam J. Wells, Ph.D., Professor

### Emeriti Faculty

Isao Fujimoto, M.A., Senior Lecturer Emeritus  
Orville E. Thompson, Ph.D., Professor Emeritus

### Affiliated Faculty

Barbara G. Goldman, Ph.D., Lecturer  
Laurie Lippin, Ph.D., Lecturer  
Paul Marcotte, Ph.D., Lecturer  
Charlie Moore, Ph.D., Lecturer  
Harland Padfield, Ph.D., Lecturer  
Bernadette Tarallo, Ph.D., Lecturer  
Al Sokolow, Ph.D., Cooperative Extension Specialist  
Joan Wright, Ph.D., Cooperative Extension Specialist

### Faculty—Human Development and Family Studies

Carolyn Aldwin, Ph.D., Professor  
Keith Barton, Ph.D., Professor  
Brenda K. Bryant, Ph.D., Professor  
Xiaoja Ge, Ph.D., Associate Professor  
Lawrence V. Harper, Ph.D., Professor  
Rosemarie Kraft, Ph.D., Associate Professor  
Beth Ober, Ph.D., Associate Professor  
Carol Rodning, Ph.D., Associate Professor



**Emeriti Faculty**

Glenn R. Hawkes, Ph.D., Professor Emeritus  
 Emmy E. Werner, Ph.D., Professor Emeritus

**Affiliated Faculty**

Curtis R. Acredolo, Ph.D., Adjunct Associate Professor  
 Marc Braverman, Ph.D., 4-H Cooperative Extension Specialist  
 Kay Jeanne Gaedeke (Stockman), M.S., Lecturer  
 Richard Ponzio, Ph.D., 4-H Cooperative Extension Specialist

**Faculty—International Agricultural Development**

Faculty includes members from various departments across colleges.

**Major Programs.** See Community and Regional Development (formerly Applied Behavioral Sciences), Human Development, and International Agricultural Development.

**Human Development**

(College of Agricultural and Environmental Sciences)

**Faculty.** See Department of Human and Community Development.

**The Major Program**

Human development explores the developmental process in humans throughout the life cycle. Cognitive and personality/social development are studied from various perspectives.

**The Program.** Human development majors complete a group of preparatory courses in anthropology, biological sciences, genetics, nutrition, physiology, psychology, statistics, and human development. Upper division students can design their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the social and the 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 requirements for the major. In addition, students can intern in schools, early childhood education 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, elementary and special educational settings, as well as governmental jobs related to social welfare and recreation. Those who emphasize the biological aspect 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 the behavioral sciences, education, child guidance, social welfare, health sciences, or further research in human development.

**B.S. Major Requirements:**

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

|                                                                                                                                                  |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                                                                     | <b>4-12</b>  |
| See College requirement .....                                                                                                                    | 0-8          |
| Additional English (choose from English 101, 102, 104A, 104B, 104C, 104D, 104E).....                                                             | 3-4          |
| <b>Preparatory Subject Matter</b> .....                                                                                                          | <b>38-44</b> |
| Anthropology 1, 2, and 15.....                                                                                                                   | 13           |
| Biological sciences (Biological Sciences 1A† or 10).....                                                                                         | 4-5          |
| † <i>Chemistry 2A is recommended prerequisite for Biological Sciences 1A. Biological Sciences 1A is prerequisite for Biological Sciences 1B.</i> |              |

|                                                                                                                                                                     |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Genetics (Molecular and Cellular Biology 10 or Biological Sciences 101) .....                                                                                       | 4            |
| Human development (Human Development 30) .....                                                                                                                      | 4            |
| Nutrition (Nutrition 10 or 101).....                                                                                                                                | 3-5          |
| Physiology (Neurobiology, Physiology and Behavior 10 or 101) .....                                                                                                  | 4-5          |
| Psychology (Psychology 1).....                                                                                                                                      | 4            |
| Statistics (Education 114, Psychology 41, Sociology 46A and 46B, or Statistics 13) .....                                                                            | 4            |
| <b>Breadth/General Education</b> .....                                                                                                                              | <b>24-32</b> |
| Satisfaction of General Education requirement .....                                                                                                                 | 16-24        |
| American history/American government (History 17A, 17B, 72A, 72B, and Political Science 1 are recommended courses).....                                             | 8            |
| <b>Depth Subject Matter</b> .....                                                                                                                                   | <b>52-53</b> |
| Human Development 100A, 100B, 100C, 110 .....                                                                                                                       | 16           |
| Social-cultural processes (Human Development 102 or 103).....                                                                                                       | 4            |
| Assessment (Human Development 120 or 121).....                                                                                                                      | 4            |
| Cognitive processes (Human Development 101 or 132).....                                                                                                             | 4            |
| Exceptional children (Human Development 130 or 131).....                                                                                                            | 4            |
| Practicum (Human Development 140-140L, or 141 or 142 or 143) .....                                                                                                  | 4-5          |
| Four additional upper division courses chosen from the Human Development courses or from a list of restricted electives (in consultation with faculty adviser)..... | 16           |
| <b>Unrestricted Electives</b> .....                                                                                                                                 | <b>39-72</b> |
| <b>Total Units for the Degree</b> .....                                                                                                                             | <b>180</b>   |

**Major Adviser.** K. Barton.

**Minor Program Requirements:**

The Department of Human and Community Development offers two minors.

UNITS

|                                                                                                                                                                                           |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Aging and Adult Development</b> .....                                                                                                                                                  | <b>21-27</b> |
| Human Development 100C, 160, 162.....                                                                                                                                                     | 11           |
| Human Development 143 .....                                                                                                                                                               | 4-8          |
| Select two courses from the following: Epidemiology and Preventive Medicine 180, Human Development 110, Community and Regional Development 173, Exercise Science 117, Sociology 127 ..... | 6-8          |

**Minor Adviser.** C. Aldwin, B. Ober.

UNITS

|                                                                     |           |
|---------------------------------------------------------------------|-----------|
| <b>Human Development</b> .....                                      | <b>20</b> |
| Human Development 100A .....                                        | 4         |
| Human Development 100B or 100C .....                                | 4         |
| Human Development 110 or 103 or 151 .....                           | 4         |
| Two courses from Human Development 101, 102, 130, 131, or 132 ..... | 8         |

**Minor Adviser.** K. Barton.

**Related Major Program.** See the major in Community and Regional Development.

**Graduate Study.** Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree in human development. See the Child Development Graduate Group and Human Development Graduate Group. Refer also to the Graduate Studies chapter of this catalog.

**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, 1303 Hart Hall (530-752-2244).*

**Lower Division Courses**

**\*12. Human Sexuality** (2) I, II, III. The Staff  
 Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fer-

tility; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunctions; lovemaking. (P/NP grading only.)

**\*13. Parenting** (4) III. Bryant

Lecture/discussion—4 hours. Provides the basis for understanding the nature of the parenting process. Consideration of aspects of parenting that begin before conception and develop throughout the life of the child and parent. GE credit: SocSci.

**\*15. Family and the Life Cycle** (4) I. The Staff

Lecture—4 hours. Prerequisite: Psychology 1, or 15 and 16. Socialization in families throughout the life cycle. Impact of alcoholism and abuse. Sources of strength and help. Not open for credit to students who have completed courses 100A, 100B, 110 and/or Psychology 112, 114, and 115. GE credit: SocSci.

**19. Life Cycles, Kinship, and Growth in Human Populations** (4) II. Carey

Lecture—3 hours; term paper. Human population at different levels of organization; including life course, family life cycle, race, ethnicity, and population traits and changes. GE credit: SciEng, Wrt.

**\*30. Observation Techniques in Human Development** (4) I, II, III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Psychology 1 and consent of instructor. Observational techniques used in the study of human behavior and development, with focus on ages six months to five years; analysis and use of observational data. *To enroll, students must sign up for laboratory time at the Child and Family Study Center.*

**\*98. Directed Group Study for Undergraduates** (1-5) I, II. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses**

**100A. Infancy and Early Childhood** (4) I.

The Staff  
 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.

**100B. Middle Childhood and Adolescence** (4) II. Ge

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.

**100C. Adulthood and Aging** (4) III. Aldwin

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."

**101. Cognitive Development** (4) II. The Staff  
 Lecture—4 hours. Prerequisite: courses 100A and 100B, or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

**102. Social and Personality Development** (4) I.

The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology; course 100B or the equivalent. Theories of development of a child's personality through interactions with children and adults; development of interpersonal and culturally valued skills.

**103. Cross-Cultural Study of Children** (4) III.

The Staff  
 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.

\*Course not offered this academic year.

**110. Contemporary American Family** (4) III. Ge  
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.

**120. Research Methods in Human Development** (4) II. Barton

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: courses 100A and 100B; elementary statistics. Research methods in selected areas of human development (e.g., infancy, learning, cognition, personality).

**121. Psychological Assessment** (4) I. Barton  
Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

**130. Emotionally Disturbed Children** (4) I.  
The Staff

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.

**131. Developmental Disabilities** (4) II. Rodning  
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities, etiology, diagnosis, education and socialization. Introduction to community resources.

**132. Individual Differences in Giftedness** (4) III.  
Kraft

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Conceptualization, identification and education of the intelligent, the creative, and the talented, gifted individual.

**140. Communication and Interaction with Young Children** (2) I, II, III. Gaedeke

Lecture—2 hours. Prerequisite: courses 30A, 100A, and 140L (concurrent enrollment recommended). Theory and practice in the area of effective interaction with young children. Humanistic, child-centered approaches; awareness of goals, beliefs, and values as these affect interactions. *To enroll, students must sign up for laboratory time at the Child and Family Studies Center.*

**140L. Laboratory in Early Childhood** (3-6) I, II, III. Gaedeke

Discussion—3 hours; laboratory—6-15 hours. Prerequisite: course 140 (may be taken concurrently). Application of theories of learning and development to interaction with children six months to five years at Early Childhood Laboratory. Applied skills in communication, discipline and curriculum. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**141. Field Studies with Children and Adolescents** (4-6) II. Kraft; III. Ponzio

Discussion—2 hours, field study—6-12 hours. Prerequisite: course 100B or the equivalent and 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 following consultation with and consent of instructor.

**\*142. Field Studies with Exceptional Children** (4-6) I. Bryant

Discussion—1.5 hours; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 (may be taken concurrently). Field study with children who are identified as developmentally disabled, emotionally distressed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

**143. Field Studies of the Elderly** (4-6) I.  
Ober/Aldwin

Discussion—2 hours; field work—6-12 hours. Prerequisite: course 100C or 160 may be taken concurrently. To apply theory and research on adult development and aging, to work with older adults in a variety of settings, and to develop skills relevant to that application. Students will also develop a small research project.

**\*151. Shared Child Care** (4) III. Werner  
Lecture—4 hours. Prerequisite: course 100A or 110, Psychology 112, or Anthropology 131. Examines roles of caregivers other than parents in contemporary society, and the impact of grandparents, siblings, family day care providers, foster parents, church- and employer-sponsored child care on children's development. Reviews child care legislation and social policy issues.

**160. Social Aspects of Aging** (4) II. Aldwin  
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. GE credit: Div.

**\*162. Issues in Aging** (3) I. Ober/Aldwin  
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 100C or 160. Research and policy issues concerning the elderly and aging in contemporary society.

**163. Cognitive Neuropsychology in Adulthood and Aging** (4) I. Ober

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). Offered in alternate years.

**190C. Introductory Research Conference** (1) I, II. The Staff

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.)

**192. Internship** (1-12) I, II, III. The Staff  
(Chairperson in charge)

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) I, II, III.  
The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**200A. Early Development** (4) I. Rodning  
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.

**200B. Middle Childhood and Adolescence** (4)  
II. Ge

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.

**200C. Development in Adulthood** (4) III.  
Ober/Aldwin

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.

**\*201. Social-Emotional Development in Infancy** (4) II. Rodning

Lecture/discussion—4 hours. Prerequisite: course 200A. Analysis of theory, methods, and research on social-emotional development in infancy. Emphasizes the development of primary and secondary emotions, and the development of attachment. Other possible topics include infant temperament, sex differences, compliance, and self-regulation. Offered in alternate years.

**\*210. Theories of Behavioral Development** (3)  
III. The Staff

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.

**\*211. Physiological Correlates of Behavioral Development** (3) I. Harper

Seminar—3 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.

**212. Adaptation and Aging** (3) II. Aldwin

Lecture/discussion—3 hours. Prerequisite: course 200C. Interdisciplinary perspective of the ways biological, psychological, and sociocultural factors affect aging and adaptation in late life. Focus is on the ways in which stress, coping, and social support affect health and the factors which contribute to optimal aging. Offered in alternate years.

**213. Cross-Cultural Study of Children** (3) I.  
The Staff

Lecture—2 hours; discussion—1 hour; field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology or Sociology. Current theory and research concerned with comparative child development. Introduction into the major issues and methods of cross-cultural research (e.g., biological, cognitive and social development of children in different cultures and subcultures in U.S.A.). Offered in alternate years.

**\*217. Development of Cortical and Perceptual Laterality** (3) I. Kraft

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.

**220. Research Methods in Human Growth and Development** (3) II. Barton

Lecture—3 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological growth, and cognitive and social/emotional development from prenatal period to death.

**\*221. Psychological Assessment of Children** (4) III. Pollitt

Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through examination, analysis and evaluation of perceptual-motor, cognitive, affective and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

**\*222. Applied Research and Program Evaluation** (3) II. Braverman

Lecture/discussion—3 hours. Prerequisite: graduate standing and consent of instructor. Focuses on the design and conduct of applied research and evaluation studies, especially with regard to programs serving children and their families. Offered in alternate years.

**225. Behavioral Development and Food Intake** (4) III. Pollitt

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (and

related fields) and Nutrition. Multidisciplinary view covering key theoretical and research issues in basic human development processes related to food intake.

**231. Issues in Cognitive and Linguistic Development** (3) I. Kraft

Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

**\*232. Cognition and Aging** (3) III. Ober  
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.

**\*237. Parent-Child Interaction** (3) III. Rodning  
Seminar—3 hours. Prerequisite: consent of instructor; upper division course on the family recommended. Current theory and research. Emphasis on parental behavior in other animals and other cultures, childrearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development. Offered in alternate years.

**\*238. The Context of Individual Development** (3) II. Bryant

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.

**\*241. Consultation Approaches to Child Development** (3) II. Bryant

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate standing; supervised field experience with children (e.g., course 140, 141, 142, may be taken concurrently); and consent of instructor. Analysis and application of theories and approaches of consultation and child development to facilitate delivery of child-related services (e.g., educational and mental health). Develop working knowledge of consultation skills for working with adults directly interacting with children and adolescents. Offered in alternate years.

**\*242. Adolescent Health Behavior: Theory and Programs** (2) II. Braverman

Lecture/discussion—2 hours. Prerequisite: graduate standing in child or human development, or consent of instructor; course 200B recommended. Theoretical conceptions relating to adolescent behaviors that have potential impact on health (e.g., use of tobacco, alcohol and other drugs; sexual behavior; accident prevention). Development and evaluation of programs that aim to influence adolescents' behaviors or attitudes in these areas. Offered in alternate years.

**\*290. Seminar** (3) I, II, III. The Staff

Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

**290C. Research Conference** (1) I, II, III. The Staff  
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.)

**291. Research Issues in Human Development** (3) I. The Staff

Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development.

**298. Group Study** (1-5) I, II, III. The Staff  
(Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff  
(Chairperson in charge)  
(S/U grading only.)

**Professional Course**

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Human Development (A Graduate Group)

Carol Bruch, J.D., Chairperson of the Group

Group Office, 1303 Hart Hall (530-752-1926)

World Wide Web: <http://hcd.ucdavis.edu/caes/hcd/graduate/hd.html>

**Faculty.** Faculty are drawn from 13 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Law and of Medicine.

**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. Admission applications must be turned in by April 1.

**Graduate Adviser.** Contact the Group Office.

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## Humanities

(College of Letters and Science)

———, Ph.D., Program Director

Program Office, 522 Sproul Hall (530-752-9934)

**Committee in Charge**

Marc E. Blanchard, Agrégé de lettres (*Comparative Literature, French*)

Naomi Janowitz, Ph.D. (*Religious Studies*)

Pablo Ortiz, Ph.D. (*Music*)

Sarah Projansky, Ph.D. (*Women's Studies*)

Janelle Reinelt, Ph.D. (*Dramatic Art*)

Michelle Yeh, Ph.D. (*East Asian Languages and Culture*)

**The Program of Study**

Courses in the Humanities Program provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.

**Courses in Humanities (HUM)**

**Lower Division Courses**

**1. Humanities Forum** (2) III. The Staff  
Seminar—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 once for credit when topic differs.

**1D. Issues and Concepts in the Humanities** (2) III. The Staff

Discussion—2 hours. Prerequisite: concurrent enrollment in course 1. Small group discussions and preparation of short papers for course 1. GE credit with concurrent enrollment in course 1: Wrt.

**2. Perspectives on the Meaning of Life** (4) III. The Staff

Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of Subject A requirement. The question, "What is the meaning of life?" is examined

from a variety of perspectives: philosophical, literary, religious and artistic. Readings from antiquity to the present, from both the Western and Eastern traditions. GE credit: ArtHum, Wrt.

**3. Medicine and Humanities** (4) III. The Staff  
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: Wrt.

**5. Representation of the Law in Literature and Film** (4) I. The Staff

Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of Subject A requirement. The relationships among literature, film, and the law, from Greek tragedy to popular American fiction and films. Common themes in law and literature portraying human experience. GE credit: ArtHum or SocSci, Wrt.

**6. Wagner and Star Wars** (4) II. Ortiz

Lecture/discussion—3 hours; extensive writing. Wagner's *Ring* and Lucas' *Star Wars*, as examples of 19th and 20th centuries approaches to the arts and their relationship with the society. GE credit: ArtHum or SocSci, Wrt.

**8. Introduction to Perspectives on Narrative** (4) III. The Staff

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) II. Martin

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) II. Martin

Discussion—2 hours. Prerequisite: course 9 concurrently. Small group discussions and preparation of short papers for course 9. Offered in alternate years.

**10. Introduction to Film Studies** (4) III. Projansky

Lecture—2 hours; discussion—1 hour; film viewing—3 hours. Introduction to the study of cinema. Exploration of the analysis of film form and examination of a variety of issues in film studies, including spectatorship and cultural context. Emphasis on critical thinking and an analytical outlook on culture, generally. GE credit: ArtHum, Div, Wrt.

**11. Shakespeare in Performance** (4) I. The Staff  
Lecture/discussion—4 hours. Reading, viewing, and discussion of one or two Shakespeare plays with focus on the relationship between text and performance (on stage and on film); analysis of the relationship between presentation of Shakespeare and cultural world view, meaning, and aesthetics. GE credit: ArtHum, Wrt.

**12. History of the Book** (4) I. The Staff  
Lecture/discussion—3 hours; extensive writing. The invention and impact of writing systems on cultures, including the invention of paper, the introduction of the codex, illustrations, the book-buying client, and the history of censorship and bookburning and their connection to the technology of the word. Offered in alternate years. GE credit: ArtHum, Wrt.

**20A. Privacy in the West** (4) II. Murav  
Lecture/discussion—3 hours; term paper. Interdisciplinary study of privacy in the West. History of privacy as a positive concept in American constitutional tradition. Supreme Court cases. Privacy as a negative concept in Western religious tradition and Marxism. Privacy and gender, e.g., Anita Hill and Clarence Thomas. GE credit: ArtHum, Wrt.



**40. Introduction to Computing in the Humanities** (4) II. Roddy

Lecture—3 hours; laboratory—3 hours. Survey of current approaches to use of computers in such fields as language, literature, history, art, music, and drama. Laboratory in text creation and analysis.

**60. Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society** (4) I. Blanchard

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.

**Upper Division Courses****118. The Emergence of Modern Hebrew Literature** (4) II. Rosenstock

Lecture/discussion—3 hours; extensive writing. Prerequisite: one lower division Humanities or foreign language course. Hebrew literature in relation to religious and social changes in Jewish life in the modern period; the rise of Hebrew modernism and Jewish nationalism; Hebrew in relation to European national literary traditions; changing gender relations as reflected in Hebrew fiction. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**119. Israeli Writing Since 1960** (4) II. Rosenstock  
Lecture/discussion—3 hours; extensive writing. Prerequisite: one course on American or European literature. Contemporary Hebrew literature 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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**120. Italian-American Cinema** (4) I. Schiesari  
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10. Broadly addresses the question of how American cinema has constructed images of race, ethnicity, gender and social class by historically examining the cinematic rendering of one ethnic group: Italian-Americans. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**122. Cinema and the American Jewish Experience** (4) I. Murav

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10 strongly recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**123. Oral History and Jewish Life** (4) III. Kahn  
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. GE credit: SocSci.

**124. Special Topics in U.S. Film History** (4) I. Projansky

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 10. Topics in U.S. film history in terms of its cultural, technological, institutional, political, and representational development. GE credit: ArtHum, Wrt.

**125. Film Genres** (4) III. Projansky

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 10. Genre theory, the historical specificity of particular genres, the structure of the film industry, and film's relationship to popular culture. GE credit: ArtHum, Wrt.

**127. Film Theory** (4) III. Ono

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10. Theories of cinematic apparatus, film form, film culture (e.g. Marxism, feminist theory, Third Cinema), focusing on explanations for the role cinema plays in relation to social institutions,

and on theory, as opposed to history, criticism, or production. Offered in alternate years.

**140. Advanced Computing in the Humanities** (4) III. Roddy

Lecture—3 hours; laboratory—3 hours; research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application and evaluation, and search strategies).

**176. "From Caligari to Hitler": A Study of Classic Weimar Cinema** (4) II. Kuhn

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10. Following Siegfried Krauer's famous study of classic Weimar cinema, this survey of German film of the 1920s critiques his teleological reading of Weimar film as the harbinger of German totalitarianism. Films include *The Cabinet of Dr. Caligari*, *The Joyless Street*, *M*, *Metropolis*, and *The Blue Angel*. Offered in alternate years. GE credit: ArtHum, Wrt.

**177. "From Hitler to Heimat": Coming to Terms with Nazism in Postwar German Film** (4) III. Kuhn

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10. Postwar German culture has been indelibly marked by the Nazi past. Course examines the contributions of New German Cinema to the project of *Vergangenheitsbewältigung*, or coming to terms with the Nazi past. Films by Fassbinder, Syberberg, Kluge, Sander, Sanders-Brahmes, Reitz. Offered in alternate years. GE credit: ArtHum, Wrt.

**180. Topics in the Humanities** (4) I, II, III. The Staff

Lecture/discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics will vary. May be repeated once for credit. GE credit: ArtHum, Wrt.

**198. Directed Group Study** (1-4) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****250. Topics in the Humanities** (4) I, II, III.

The Staff (Program Director in charge)  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.

**299. Individual Research** (1-4) I, II, III. The Staff (Program Director in charge)

Individual research in the humanities resulting in a formal written research report. (S/U grading only.)

## Hydrologic Sciences (A Graduate Group)

Graham E. Fogg, Ph.D., Chairperson of the Group  
Group Office, 113 Veihmeyer Hall (530-752-0453)  
World Wide Web: <http://qavis.ucdavis.edu>

**Faculty.** The Group consists of faculty members from the Departments of Chemical Engineering; Civil and Environmental Engineering; Environmental Science and Policy; Geology; and Land, Air and Water Resources.

**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, cir-

ulation 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. The program has degree options in Hydrobiology, Hydrogeochemistry and Hydrology. The Hydrology option includes specializations in surface hydrology, subsurface hydrology, irrigation and drainage, 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. 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.** M.E. Grismer, J.W. Hopmans, M.A. Mariño (*Land, Air and Water Resources*).

## Courses in Hydrologic Sciences (HYD)

**Graduate Courses****200. Survey of Hydrologic Sciences** (1) I, II, III. Grismer

Seminar—1 hour; 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 twice for credit. (S/U grading only.)

**210. Hydrologic Modeling of the Vadose Zone** (3) III. Hopmans

Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 107, Mathematics 22B, Programming Language. Principles and modeling of soil water, solute transport, heat and water flow, root water and nutrient uptake. Numerical techniques to incorporate soil heterogeneity. Not open for credit to students who have taken Water Science 200 or course 210. Offered in alternate years.

**212. Evapotranspiration** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 103. Review of lower atmosphere properties; introduction to similarity theory; surface roughness parameterization, calculation of energy fluxes, local advection and turbulence measurements will be studied in the field. Not open for credit to students who have completed Water Science 202. Offered in alternate years.

**236. Hydrochemical Models** (3) II. Tanji

Lecture—2 hours; laboratory—3 hours. Prerequisite: background in applied chemistry and PC and mainframe computers; numerical analyses recommended. Application of mathematical and computer models to chemical problems. Emphasis on process level models (transport, rate and equilibrium) with same exposure to systems level models. Not open for credit to students who have completed Water Science 217.

**243. Water Resource Planning and Management** (3) I. Mariño

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.) Not open for credit to students who have com-

pleted Water Science 206. (Former course Water Science 206.)

**264. Modeling of Hydrologic Processes** (3) III. Puente

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. (Former course 254.)

**269. Numerical Modeling of Groundwater Systems** (3) III. Fogg

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. Not open for credit to students who have completed course 220. (Former course 220.)

**\*273. Introduction to Geostatistics** (3) I. Fogg  
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. Not open for credit to students who have completed course 230. Offered in alternate years.

**275. Analysis of Spatial Processes** (3) III. Puente

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. Not open for credit to students who have completed course 255 or Water Science 255. Offered in alternate years.

**290. Seminar in Hydrologic Science** (1) III. The Staff

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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Professional Courses**

**410. OSHA HAZWOPER Refresher Course** (1) II. Grismer

Lecture—1 hour. Updates hazardous materials handling information of purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.)

**440. Hazardous Waste Operations Training** (3) III. Grismer

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.)

**Hydrology**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Land, Air and Water Resources, Hydrologic Science Section.

**The Major Program**

Hydrology is the study of the occurrence, distribution, circulation, and behavior of water in the environment of Earth. It includes measurement and analysis of water phenomena in the subsurface, on the Earth's surface, and in the atmosphere for the purpose of understanding and addressing problems that affect sustainability of both water quantity and water quality.

**The Program.** Hydrologists generally need strong backgrounds in physics, mathematics, chemistry, biology, geology, field methods, and computer methods. Knowledge of biology and chemistry is important for understanding modulators of water quality. Geology is essential for those working in groundwater hydrology. Field methods are necessary for observing and measuring hydrologic phenomena, and computer methods and mathematics are routinely needed for collectively analyzing field data and forecasting future system behavior.

Contemporary hydrologic problems include more efficient use and development of groundwater and surface water resources; pollution of subsurface and surface waters from such sources as urban runoff, leaky underground storage tanks, and agricultural drainage; water quality criteria for drinking water and for fish and aquatic life; acidic precipitation and its impact on the environment; and the role of water in natural disasters such as flooding, landslides, and land subsidence. Other contemporary concerns include artificial recharge of groundwater, remote sensing for water resources, risk analysis in the operation of surface water reservoirs, and hydrologic prediction under uncertainty. The resolution of these problems demands hydrologic scientists with the comprehensive, multidisciplinary education embodied in this program.

**Internships and Career Alternatives.** Numerous opportunities for internships exist with state and federal agencies in the Greater Sacramento–Davis area. Career opportunities in hydrologic science are available in private consulting firms, environmental interest groups, and government agencies dealing with water resources, including the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural Research, Forest Service, and Soil Conservation Service), Environmental Protection Agency, national research laboratories (Lawrence Livermore National Laboratory, Oak Ridge National Laboratory), and California Departments of Water Resources, Water Resources Control Board, Regional Water Quality Control Boards, Conservation, Fish and Game, and Toxic Substances. The major is excellent preparation for advanced degrees in hydrologic science and related fields.

**B.S. Major Requirements:**

|                                                                 |              |
|-----------------------------------------------------------------|--------------|
|                                                                 | UNITS        |
| <b>Written/Oral Expression</b> .....                            | <b>0-8</b>   |
| See College requirement                                         |              |
| <b>Preparatory Subject Matter</b> .....                         | <b>72</b>    |
| Biological sciences, Biological Sciences 1A, 1B, 1C .....       | 15           |
| Chemistry, Chemistry 2A, 2B, 2C .....                           | 15           |
| Physics, Physics 9A, 9B, 9C .....                               | 12           |
| Calculus, Mathematics 21A, 21B, 21C, 21D .....                  | 16           |
| Linear algebra, Mathematics 22A .....                           | 3            |
| Differential Equations, Mathematics 22B .....                   | 3            |
| Physical geology, Geology 50, 50L .....                         | 5            |
| Applications of computers, Engineering 5 or the equivalent..... | 3            |
| <b>Breadth/General Education</b> .....                          | <b>18-24</b> |

**Depth Subject Matter**.....**44-54**

|                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Fluid mechanics, Hydrologic Science 103, Engineering 103A and 103B, or Chemical Engineering 150A and 150B, or Civil and Environmental Engineering 141 and 141L ..... | 6-8 |
| Hydrology, Hydrologic Science 126, 134, 141, 142, 143, 145, 146 .....                                                                                                | 28  |
| Field and laboratory methods, Hydrologic Science 101A, 101B .....                                                                                                    | 6   |
| Soil physics, Soil Science 107 .....                                                                                                                                 | 4   |
| Probability and statistics, Civil and Environmental Engineering 114 or Statistics 130A and 130B .....                                                                | 4-6 |
| Water policy and law, select one of Agricultural and Resource Economics 147, Environmental Science and Policy 161, 166 .....                                         | 3-4 |

**Restricted Electives**.....**16-26**

Students select an area of concentration in consultation with the Master Adviser, and then obtain prior approval from the Master Adviser for courses used to satisfy the student's area of concentration. Areas of concentration include:

- Surface hydrology* (Atmospheric Science 115, 133, Environmental Science and Policy 155, Environmental Science and Policy /Geology 150A, Geology 135, Soil Science 118
- Hydrogeology* (Geology 60, 60L, 100, 100L, 101, 101L, 103, 109, 109L, 161, Soil Science 120, Applied Science Engineering 115)
- Remote sensing* (Applied Biological Systems Technology 180, 181, Environmental and Resource Sciences 180)
- Water management (irrigation and drainage)* Hydrologic Science 115, 117, 124, Environmental and Resource Sciences 110)
- Water quality* (Environmental and Resource Sciences 130, Environmental Toxicology 101, 112A, Environmental Science and Policy 151, Soil Science 111, Hydrologic Science 122, Chemistry 8A-8B-8C, 128

**Unrestricted Electives**.....**6-20**

(Including units earned from 192 and 199 courses.)

**Total Units for the Degree**.....**180**

**Major Adviser.** M. Grismer.

**Minor Program Requirements:**

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.

**Hydrology**.....**19-21**

|                                                                                                                                                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Hydrologic Science 103, Engineering 103A and Hydrologic Science 141; or Environmental and Resource Sciences 100 and 100L .....                                                                                                       | 6-7 |
| Atmospheric Sciences 115, Environmental and Resource Sciences 130 .....                                                                                                                                                              | 6   |
| Select two courses from Atmospheric Sciences 133, Environmental and Resource Sciences 110, 120, 180, Environmental Science and Policy 150A, 151, Geology 135, Hydrologic Science 115, 126, 145A and 145B, Soil Science 107, 118..... | 6-8 |

\*Course not offered this academic year.

**Graduate Study.** See the Hydrologic Sciences Graduate Group.

## Courses in Hydrologic Science (HYD)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 111A Veihmeyer Hall or 122 Hoagland Hall (530-752-1669).

### Lower Division Courses

#### 92. Hydrologic Science Internship (1-12) I, II, III. The Staff

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.)

### Upper Division Courses

#### 103. Introduction to Fluid Mechanics (3) I. Parlange

Lecture—3 hours. Prerequisite: Physics 5A and Mathematics 16B; course 100 recommended; or consent of instructor. An introductory course in fluid properties, fluid statics, conservation of mass, momentum and energy. Dimensional analysis and boundary layer flow phenomena will also be considered. Not open for credit to students who have completed Water Science 142.

#### 110. Irrigation Principles and Practices (3) III. Schwankl

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 5A; Soil Science 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops; procedures for determining frequency and depth of irrigation, drainage. Not open for credit to students who have completed Water Science 110.

#### 115. Irrigation and Drainage Systems (4) II. Wallender, Grismer, Hills

Lecture—4 hours. Prerequisite: Engineering 103A or course 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 will be emphasized. Not open for credit to students who have completed Water Science 145. (Same course as Biological Systems Engineering 145.)

#### 117. Irrigation Water Management (3) III. Hopmans

Lecture—2 hours; discussion—1 hour. Prerequisite: course 110 or 124. Irrigation principles of soil-water and plant-water relations with irrigation system characteristics and other factors into an analytical framework for irrigation water management. Case studies discussed. Not open for credit to students who have completed Water Science 172.

#### 122. Biology of Running Waters (3) I. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in biology and junior standing. The study of lotic aquatic animals and plants in relation to their environment; various factors affecting the distribution of freshwater plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil and water science, and renewable natural resources. Not open for credit to students who have completed Water Science 122.

#### 122L. Biology of Running Waters Laboratory (2) I. The Staff

Laboratory—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and junior standing; course 122 (concurrently). Course allows interested students to obtain experience in sampling, processing, and synthesizing field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems. Not open for credit to students who have completed Water Science 122L.

#### 124. Plant-Water-Soil Relationships (4) III. Hsiao

Lecture—3 hours; discussion—2 hours. Prerequisite: course 100; Soil Science 100 recommended; and one additional course in botany or plant physiology; or consent of instructor. Principles of plant interactions with soil and water environments and their applications in crop and environmental management. Includes nutrient and water uptake and transport; transpiration; soil processes affecting supplies; deficiencies and plant responses. Not open for credit to students who have completed Water Science 104.

#### 134. Aqueous Geochemistry (4) III. Casey

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2B, upper division standing. Covers the dielectric properties of water; thermodynamic and mass-action relations; electrolyte activities; metal hydrolysis equilibria; metal coordination chemistry; solubility calculations; electron-exchange reactions; and rate laws.

#### 141. Physical Hydrology (4) I. Puente

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.

#### 142. Systems Hydrology (4) II. Puente

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.

#### 143. Watershed Analysis (4) III. The Staff

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 142 and knowledge of computer programming. Introduction to watershed modeling and application of GIS to watershed analysis. Modeling techniques associated with precipitation, infiltration, runoff, snowmelt, soil erosion and subsurface flows are presented in conjunction with spatial data analysis and characterization and digital terrain modeling aspects of GIS.

#### 145. Groundwater Hydrology (3) I. Marino

Prerequisite: Mathematics 16B, course 103 or Engineering 103A recommended. Occurrence, distribution, and movement of groundwater. Steady and transient groundwater flow systems. Aquifer tests. Well construction, operation and maintenance. Groundwater exploration. Groundwater quality and contamination. Not open for credit to students who have completed course 145A.

#### 146. Hydrogeology and Contaminant Transport (4) II. Fogg

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 145 or Civil and Environmental Engineering 144 or the equivalent. Physical and chemical processes in contaminant transport, with emphasis on effects of aquifer complexity. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport modeling. Laboratory includes field pumping test and work with physical and computer models. Not open for credit to students who have completed Water Science 149B and 149L, or course 145B.

#### 151A. Field Methods in Hydrology (3) II. Grismer

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142 and 145. Measurement methods and analysis associated with the evaluation of water movement in the field. Sampling methods and use of data loggers and other sampling equipments are emphasized. Skills developed here will be applied to different field sites in course 101B.

#### 151B. Field Methods in Hydrology (3) III. Grismer

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 151A. Data collection methods in the lab and field associated with water movement in the environment. Using the skills developed in course 151A, students evaluate water resource and contamination issues quantitatively at surface and ground water field sites.

#### 182. Environmental Analysis with Geographical Information Systems (GIS) (5) I. The Staff

(Chairperson in charge)  
Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: Applied Biological Systems Technology 180; Applied Biological Systems Technology 181 recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment. Precision farming. Natural resource management. Spatial database structures. Remote sensing applications. Data quality and error analysis in GIS. (Same course as Applied Biological Systems Technology 182.)

#### 192. Hydrologic Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Internship—3-36 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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: senior standing. (P/NP grading only.)

## Immunology (A Graduate Group)

M. Eric Gershwin, M.D., Chairperson of the Group  
Group Office, 1202E Meyer Hall (530-752-2512)

**Faculty.** The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Immunology is a multidisciplinary group offering programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. Possible areas of specialization include molecular biology, immunochemistry, immunogenetics, cellular immunology, clinical immunology, and tumor and developmental immunology.

**Preparation.** Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, zoology or botany, general bacteriology or microbiology, general genetics, mathematics, general physics, chemistry, and biochemistry.

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, protozoology, 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.** Contact the Group Office.



## Courses in Immunology (IMM)

Additional courses are available and listed under the individual sponsoring departments. Contact the group office for information.

### Graduate Courses

**292. Immunotoxicology Seminar** (2) I. Golub 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.)

**295. Cytokines: An Expanding Class of Cell Regulatory Agents** (2) II. Benton, Erickson Lecture/discussion—2 hours. Prerequisite: undergraduate courses in immunology, cell biology and biochemistry. Lectures, discussion and presentations which examine the role of cytokines in immunity, inflammation tissue injury and disease. Current knowledge of their molecular structures, specific receptors, antagonists and signalling mechanisms will be discussed.

**296. Advanced Topics in Immunology** (3) II. Cheung Seminar—3 hours. Prerequisite: graduate standing. Presentation, discussion and analysis of research topics in immunology, with emphasis on investigative bench research. (S/U grading only.)

## Independent Study Program

Information:

Chairperson  
Committee on Courses of Instruction  
c/o Academic Senate Office (530-752-2220)

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 the term in which the project is to be undertaken. (See the Academic Calendar at the front of the catalog 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 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 which 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

Academic Advising Center, 228 Mrak Hall  
(530-752-0610)

**Student Proposal.** An Individual Major may be organized for 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 at least **four quarters** before graduation, for review by the Individual Major Committee. This proposal must include (1) a description of the special educational aims of the student, including a statement indicating why the educational objectives cannot be met by existing majors; and (2) a list of planned courses. It is critical that you contact the Academic Advising Center for consultation and development of the proposal.

### B.S. Major Requirements:

|                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | UNITS             |
| <b>English Composition requirement</b> .....                                                                                                                                                                                                                                                                                                                                                                                                  | <b>0-8</b>        |
| See College requirement                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                       | <b>(variable)</b> |
| Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.                                                                                                                                                                                                                                                                                                                               |                   |
| <b>Breadth/General Education</b> .....                                                                                                                                                                                                                                                                                                                                                                                                        | <b>6-24</b>       |
| Satisfaction of General Education requirement                                                                                                                                                                                                                                                                                                                                                                                                 |                   |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                             | <b>45-54</b>      |
| Upper division course work must include (a) interrelated courses of 45 upper division units from two or more areas of study, and (b) at least one of the two or more areas of study must be within the College of Agricultural and Environmental Sciences; and (c) at least 30 or 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 Degree**.....**180**

**Master Adviser.** R. Green (*Agricultural and Resource Economics*).

### College of Letters and Science

Program Office, 200 Social Sciences and Humanities Building (Dean's Office), (530-752-0392)

#### Committee in Charge

Richard Cowen, Ph.D., Chairperson (*Geology*)  
Jack Goldberg, Ph.D. (*Neurobiology, Physiology and Behavior*)  
Richard Levin, Ph.D. (*English*)  
Pablo Ortiz, Ph.D. (*Music*)  
Belinda Robnett, Ph.D. (*Sociology, Women's Studies*)

**Student Proposal.** A student who wishes to propose an individual major should submit the proposal to the Faculty Committee on Individual Majors in the College

of Letters and Science **by the end of the fourth full week of the fifth quarter before graduation.** 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             |
| <b>Preparatory Subject Matter</b> .....                                                                                        | <b>(variable)</b> |
| Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.                |                   |
| <b>Depth Subject Matter</b> .....                                                                                              | <b>45-54</b>      |
| 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** .....

**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 Studies

Nora A. McGuinness, Ph.D., Program Director  
Program Office, 162 Kerr Hall (530-752-9797)

### Committee in Charge

Richard T. Curley, Ph.D. (*Anthropology*)  
Douglas W. McColm, Ph.D. (*Physics*)  
Nora A. McGuinness, Ph.D. (*Integrated Studies*)  
Jay E. Mechling, Ph.D. (*American Studies*)  
Chairperson  
Kenneth L. Verosub, Ph.D. (*Geology*)

### Faculty

Richard T. Curley, Ph.D., Senior Lecturer (*Anthropology*)  
Evan Fletcher, Ph.D., Lecturer (*Computer Science*)  
Gail S. Goodman, Ph.D., Professor (*Psychology*)  
Jerold A. Last, Ph.D., Professor (*Internal Medicine, Biological Chemistry*)

Nora A. McGuinness, Ph.D., Academic Coordinator  
*(Integrated Studies/Davis Honors Challenge)*  
 Jay Mechling, Ph.D., Professor *(American Studies)*  
 Eric Schroeder, Ph.D., Lecturer *(English)*  
 Kenneth A. Shackel, Ph.D., Associate Professor  
*(Pomology)*  
 Gergely Zimanyi, Ph.D., Associate Professor  
*(Physics)*

**The Program of Study**

Integrated Studies is an invitational, first-year, residential honors program associated with the Davis Honors Challenge. Established in 1969, the program aims to help high-achieving students integrate knowledge gained from humanities, natural sciences, and social sciences study and organize their learning experiences through interdisciplinary or multidisciplinary approaches to a common theme. The theme for 1997-2000 is "End of the Century—the End of the Millennium." Enrollment is limited to 25 students per class, and program membership is limited to the top 3% of the entering class. (In 1998-99, 69 students will be admitted to the program.)

Students enroll in three Integrated Studies courses and two seminars during the year. **Students not admitted to the Program may not register for Integrated Studies courses or seminars.**

For more information about the Davis Honors Challenge, see the section titled "Honors Challenge."

**Courses in Integrated Studies (IST)**

**Lower Division Courses**

**\*1A. Science and Engineering: Physics (4) III.** McCole

Lecture—2 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physics from 600 B.C. to the present day. Changes in ideas about the physical universe explored. Problem solving not emphasized.

**\*2A. Arts and Humanities: Mathematics and Civilization (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Topics from arithmetic, geometry, algebra and probability presented in historical context which is designed to convey an appreciation of the role that mathematics has played in shaping our world and civilization.

**\*2C. Arts and Humanities: Origins of Western Civilization (4) III.** Roller

Lecture—3 hours; discussion—1 hour. Civilizations of the ancient Near East and Greece: the problem of divine-human relations, problems of law and justice, and development of science and of logical thought. Readings include selections from Near Eastern texts and from Greek literature.

**2E. Arts and Humanities: Playing Shakespeare (4) III.** The Staff

Lecture—3 hours; laboratory—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatre professional: producer, actor, director. His use and development of Elizabethan theatre acting space. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

**\*3A. Social Sciences: History in Our Time (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Major political, economic, historical, and ideological changes in the global community since the 1970s.

**\*3B. Society Through Literature: Modern Europe (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian revolution, two world wars, the rise of Fascism, Nazi holocaust, and the decline of Europe as the center of world politics.

**\*3E. Social Sciences: Sociology (4) III.** The Staff  
 Lecture—2 hours; discussion—2 hours. Introduction to modern sociological research and theory utilizing material drawn from three topical areas: the develop-

ment of gender identities, the social production of scientific and other forms of knowledge, and the social basis of religious belief.

**8. Colloquium (1) I, II.** The Staff (N. McGuinness in charge)

Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)

**8A. Special Topics in Natural Science and Mathematics (4) I, II, III.** The Staff

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.

**8B. Special Topics in Humanities (4) I, II, III.** The Staff

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.

**8C. Special Topics in the Social Sciences (4) I, II, III.** The Staff

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.

**9. Seminar (1) I, II, III.** The Staff (N. McGuinness in charge)

Lecture—1 hour. Lectures, films, and readings on the themes for the year. May be repeated for credit. (P/NP grading only.)

**Upper Division Course**

**197T. Tutoring in Integrated Studies (1-4) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of Director of Integrated Studies. Tutoring in lower division 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. (P/NP grading only.)

**Interior Design**

See Design

**Internal Medicine**

See Medicine, School of

**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.** International agricultural development majors may select their areas of technical specialization from any of the agricultural and environmental sciences, for example, agricultural economics, agricultural engineering, animal science, community development, food science, plant science, or resource science. Students interested in international work also need to develop the qualities necessary for effective performance in developing areas of the world. Courses in social sciences, humanities, and economics work toward this end by providing an understanding of the broad cultural, social, and economic environments in which agriculture operates in countries outside of 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:**

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

|                                                                                                                                                                                                                                                                             |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                             | UNITS        |
| <b>English Composition Requirement.....</b>                                                                                                                                                                                                                                 | <b>0-8</b>   |
| See College requirement                                                                                                                                                                                                                                                     |              |
| <b>Preparatory Subject Matter.....</b>                                                                                                                                                                                                                                      | <b>39-43</b> |
| Choose either Social Sciences or Natural Science core.                                                                                                                                                                                                                      |              |
| Social Sciences core.....                                                                                                                                                                                                                                                   | 39           |
| Chemistry (Chemistry 10) .....                                                                                                                                                                                                                                              | 4            |
| Science (Biological Sciences 10, Agricultural Systems and Environment 2, Agricultural Science 1, Nutrition 10, Soil Science 10) .....                                                                                                                                       | 15           |
| Social sciences (Community and Regional Development 1, Anthropology 2, Political Science 2, Sociology 1, History 4C) .....                                                                                                                                                  | 16           |
| Statistics (Agricultural Systems and Environment 120 or Statistics 13 or Sociology 46A).....                                                                                                                                                                                | 4            |
| Natural Science core.....                                                                                                                                                                                                                                                   | 54           |
| Biological sciences (Animal Science 2, Biological Sciences 1A, 1B, 1C, 101, Agricultural Systems and Environment 2) .....                                                                                                                                                   | 15-27        |
| Chemistry (Chemistry 2A, 2B, 8A, 8B) .....                                                                                                                                                                                                                                  | 16           |
| Mathematics (Mathematics 16A or 21A) .....                                                                                                                                                                                                                                  | 3-4          |
| Physics (Physics 1A).....                                                                                                                                                                                                                                                   | 4            |
| Statistics (Agricultural Systems and Environment 120 or Engineering: Computer Science 10).....                                                                                                                                                                              | 4            |
| <b>Breadth/General Education .....</b>                                                                                                                                                                                                                                      | <b>6-24</b>  |
| Satisfaction of General Education requirement                                                                                                                                                                                                                               |              |
| <b>Depth Subject Matter .....</b>                                                                                                                                                                                                                                           | <b>38</b>    |
| International Agricultural Development 10, 110, 111 .....                                                                                                                                                                                                                   | 8            |
| International agricultural development (International Agricultural Development 102, 103, 190, 191, 195, 198; Agricultural Systems and Environment 110A, 110B, 110C) .....                                                                                                   | 12           |
| Economics and social sciences: Economics 1A-1B and two upper division courses relevant to development (Agricultural and Resource Economics 100A, 100B, 106, 113 or 136, 140, 145, 147, 150, 176; Economics 100, 110A, 115A, 115B; Anthropology 126, 131, 135; Community and |              |

Regional Development 153; Political Science 126, 146, 148A-148B; Sociology 144, 145A, 145B).....18

**Primary Field of Specialization** .....60

*Natural Sciences or Social Sciences:* Courses chosen by student, with an adviser in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.

*Natural Sciences:*

Student should include some course work in social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history, or political science area studies courses).

**Unrestricted Electives** .....1-34

Students not possessing a reading/speaking ability in a foreign language will be encouraged to use these electives for language study or to attend an intensive language school.

**Total Units for the Degree**.....180

**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.** S.B. Brush (*Human and Community Development*).

**Minor Program Requirements:**

UNITS

**International Agricultural Development**.....20

International Agricultural Development 10, 102, 110, 111; Agricultural Systems and Environment 110A, 110B, 110C .....16  
Minimum of four units chosen from Agricultural Systems and Environment 111, International Agricultural Development 103, 141, 190, 195, Economics 115A-115B .....4

**Minor Adviser.** S.B. Brush (1331 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 Coordinator of Graduate Recruitment (I.A.D.), Graduate Studies, UC Davis.

**Graduate Advisers.** J. Hill (*Agronomy and Range Science*), F.W. Hirtz (*Human and Community Development*), L.S. Jarvis (*Agricultural and Resource Economics*), J.D. Momsen (*Human and Community Development*), D.E. Rains (*Agronomy and Range Science*).

**Related Courses.** See Agricultural and Resource Economics 148, 215C, Agricultural Systems and Environment 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) II. Brush

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.

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

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) III. Brush

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.

**104. Gender and Environment in the Developing World** (4) III. Momsen

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 recommended. Examines how environmental problems in the countries of Africa, Asia and Latin America affect men and women differently and the impact of structural adjustment on the environment in rural and urban areas.

**110. Agricultural Production Economics** (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division status and an introductory course in microeconomics (Economics 1A). Economic analysis of agricultural production in low income countries, from field-level data collection to national food policy. Emphasis on construction and use of farm models in project evaluation.

**111. Agricultural Marketing Systems** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status and an introductory course in microeconomics recommended (Economics 1A). Economic analysis of agricultural marketing systems in low income countries, including the functions of transportation, storage, packaging, handling, grading and standardization, processing, and market news. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

**\*142. Equipment and Technology for Small Farms** (2) III. Rumsey, Plant

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** (2) I. Weinbaum

Lecture/discussion—2 hours. Prerequisite: Agricultural System and Environment 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Studies 100). Explores traditional and evolving use of trees in agricultural ecosystems, their multiple roles in environmental stabilization and the production of food, fuel and fiber, and socioeconomic barriers to adoption. Offered in alternate years. (Same course as Agricultural Systems and Environment 160.)

**\*190. Proseminar in International Agricultural Development** (1) I, II, III. The Staff

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.)

**\*191. Topics in International Agricultural Development** (3) I, II, III. The Staff

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations—variable content. May be repeated for credit.

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

**195. Field Study in Agricultural Development** (3) III. The Staff

Lecture—2 hours total; seminar—8 hours total; field work—overnight trips to sites in California (four two-day visits) or Mexico (one eight-day visit). Students will incur travel expenses. Observation of agricultural development strategies and impact 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 United States agriculture. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**200. Analysis and Determinants of Cropping Systems** (2) III. van Kessel

Lecture—1 hour; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 150. Cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability, management strategies, resource use efficiency and their interactions.

**201. The Economics of Small Farms and Farming Systems** (4) II. Jarvis

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.

**202. Social Systems and Agricultural Development** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in economic development, cultural anthropology, sociology, or political science (especially comparative politics or public administration), or consent of instructor. Social and cultural factors in agricultural and rural development; adaptation of rural people to development process; agrarian movements and revolution; evaluation of theories of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.

**203. Management Systems for Agricultural Development** (4) II. Leonard

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferably, or 202; or consent of instructor. Contexts of agricultural and rural development; strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; delegation, decentralization, devolution, deconcentration, and dispersal.

**217. Conservation and Sustainable Development in Third World Nations** (4) III. Orlove

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 Ecology 217.)

**\*220. Food and Nutrition Strategies in Developing Countries** (4) I. Jarvis

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.

**290. Seminar in International Agricultural Development (1-2)** I, II, III. The Staff 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.)

**291. Topics in International Agricultural Development (1-3)** I, II, III. The Staff 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 once for credit.

**292. Graduate Internship (1-12)** I, II, III. The Staff 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)** I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

**299. Research (1-12)** I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

## International Agricultural Development (A Graduate Group)

\_\_\_\_\_, Chairperson of the Group  
Group Office, 1303 Hart Hall (530-752-1926)  
World Wide Web: <http://hcd.ucdavis.edu>

**Faculty.** The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

**Graduate Study.** The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. The group's approximately 85 faculty members possess a wide range of experience in international development.

The philosophy guiding the program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, to apply their specializations, graduates should be perceptive and understanding of people in developing nations, and have a comprehension of how technological, social, economic, and political variables affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate changes.

The program provides a multidisciplinary education designed to recognize these needs. It guides students to the knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate. Specialization is available in fields ranging from agricultural economics, agronomy, animal science, and community development to agricultural ecology, international nutrition, and women's issues, all with an emphasis on international development.

**Graduate Adviser.** Contact the Group Office.

## International Nutrition

Kenneth H. Brown, M.D., Program Director  
Program Office, 3150 Meyer Hall (530-752-1992)  
World Wide Web: <http://www-nutrition.ucdavis.edu/pin/DESEMPH.HTM>

### Faculty

Lindsay H. Allen, Ph.D., Professor (*Nutrition*)  
Kenneth H. Brown, M.D., Professor (*Nutrition*)  
Kathryn G. Dewey, Ph.D., Professor (*Nutrition*)  
Louis E. Grivetti, Ph.D., Professor (*Nutrition*)  
Charles H. Halstead, M.D., Professor (*Internal Medicine*)  
Lovell S. Jarvis, Ph.D., Professor (*Agricultural and Resource Economics*)  
Lucia Kaiser, Ph.D. (*Cooperative Extension*)  
Bo L. Lönnerdal, Ph.D., Professor (*Nutrition*)  
Suzanne Murphy, Ph.D., (*EFNEP Program Director*)  
Benjamin Orlove, Ph.D., Professor (*Environmental Science and Policy*)  
Ernesto Pollitt, Ph.D., Professor (*Pediatrics*)

**Graduate Study.** The Program in International Nutrition, an organized research unit located in the Department of Nutrition, coordinates specialized course work and research leading to the *designated emphasis* in International 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. 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 Nutrition.

Students accepted into the following doctoral programs are automatically eligible to participate in the designated emphasis: Nutrition, Agricultural 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 on their diploma for the designated emphasis in international nutrition.

**Graduate Adviser.** Contact the Program Office.

## International Relations

(College of Letters and Science)  
Emily O. Goldman, Ph.D., Program Director  
Program Office, 1270 Social Sciences and Humanities Building (530-752-3063)

### Committee in Charge

Robert Blake, Ph.D. (*Spanish*)  
David J. Boyd, Ph.D. (*Anthropology*)  
Daniel R. Brower, Ph.D. (*History*)  
Gregory Clark, Ph.D. (*Economics*)  
Robert Flocchini, Ph.D. (*Crocker Nuclear Laboratory*)  
Emily O. Goldman, Ph.D. (*Political Science*)  
Jack A. Goldstone, Ph.D. (*Sociology*)  
Scott McLean, Ph.D. (*Comparative Literature*)  
Miroslav Nincic, Ph.D. (*Political Science*)

Michael P. Smith, Ph.D. (*Human and Community Development*)  
Geoffrey Wandesforde-Smith, Ph.D. (*Political Science*)

## 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, geography, and history. Upper division work is composed of twelve courses chosen from one of four tracks which encompass major topical areas in combination with an area studies emphasis: I. World Trade and Development, II. Peace and Security, III. Global Environment, Health, and Natural Resources, IV. Peoples and Nationalities. 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.

**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 the UC Davis Washington Center listing). 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 students to participate in the UC Education Abroad Program. A maximum of five courses taken abroad may be applied toward the 12 upper division courses in the International Relations major. 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 complete the following courses with a combined GPA of at least 2.50 (all courses must be taken for a letter grade):

|                           |          |
|---------------------------|----------|
| Economics 1A, 1B .....    | 10 units |
| Geography 10 .....        | 3 units  |
| History 4C or 10.....     | 4 units  |
| Political Science 3 ..... | 4 units  |

### A.B. Major Requirements:

|                                                                                                                                                                   | UNITS        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter .....</b>                                                                                                                           | <b>24-27</b> |
| Economics 1A, 1B.....                                                                                                                                             | 10           |
| Geography 10 .....                                                                                                                                                | 3            |
| History 4C or 10 .....                                                                                                                                            | 4            |
| International Relations 1 or Political Science 3 .....                                                                                                            | 4            |
| One course selected from Anthropology 2, Environmental Science and Policy 10, International Agricultural Development 10, Political Science 2, Sociology 4, 5..... | 3-4          |
| Recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)                                                                                   |              |
| Note: Mathematics 16A is a required prerequisite for some courses.                                                                                                |              |
| Foreign language .....                                                                                                                                            | 0-30         |
| One of the following series in a single language:                                                                                                                 |              |
| Cantonese 1, 2, 3, 4, 5, and 6.....                                                                                                                               | 24           |

## 314 Internship Program

Chinese 1, 2, 3, 4, 5, and 630  
or Chinese 7, 17, 2715  
or Chinese 8, 18, 28.....15  
French 1, 2, 3, 21, 22.....25  
German 1, 2, 3, 20, 21.....23  
Italian 1, 2, 3, 4, 521  
or Italian 1, 2, 3, 8A, 8B.....21  
Japanese 1, 2, 3, 4, 5, 630  
or Japanese 8, 18, 28.....15  
Russian 1, 2, 3, 4, 5.....23  
Spanish 1, 2, 3, 21, 2225  
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 .....47-50

Twelve 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 or 104; 101 or 105; 160A-160B, Political Science 123 .....20-22  
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):*

Anthropology 127, Community and Regional Development 141, 156, Economics 110B, 116, Political Science 102, 130, 140, Sociology 139, 141, 143A

*Group B courses (Developing Countries):*

Anthropology 122, 123C, 126, 127, 135, Community and Regional Development 153, Economics 110B, Geography 156, International Agricultural Development 103, Political Sciences 102, 124, 126, 178, Sociology 141, 145A

#### 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 Comparative Literature 157, Economics 116, Geography 143, History 145, 146A, 146B, Philosophy 118, Physics 137, Political Science 112, 126, 128, 131, 140, 177, Sociology 100, 118 .....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 115A or 115B  
Economics 162.....4  
Political Science 122, 123.....8  
Select one from Agricultural and Resource Economics 175, 176, Economics 115A, or Physics 160.....4

Select one from Agricultural and Resource Economics 147, Anthropology 121N, Environmental Science and Policy 164, Political Science 107.....3-4

Select three additional courses from two of the following groups.....9-12

*Atmospheric environments:*

Atmospheric Science 116, Environmental and Resource Sciences 131

*Marine environments:*

Environmental and Resource Sciences 121, Geology 116, International Relations 131

*Land use and food supply:*

Agricultural Systems and Environment 101, 150, Community and Regional Development 142, Biological Sciences 151

*Energy supplies and technology:*

Environmental Science and Policy 167, Geology 130, Political Science 171

*Human populations:*

Anthropology 101, 133, Geography 156, Political Science 102, Sociology 170

*Health:* Environmental Science and Policy 126, Environmental Toxicology 101, 112A, Infectious Diseases (Internal Medicine) 141, Medical Microbiology 115, Nutrition 111, 118

Four courses to fulfill Area Studies Requirement .....16

#### Track IV: Peoples and Nationalities

(Examines social and cultural foundations of national development and international relations)

Anthropology 133 .....4  
Political Science 124 .....4  
Sociology 118.....4  
Select one course from Community and Regional Development 176, Political Science 126 .....4

Select four courses from at least two departments .....16

Anthropology 123A, 123B, 123C, 124, 126, 131, 135, Chicana/o Studies 140, Communication 145, Human Development 103, Philosophy 105, Political Science 128, 178, Religious Studies 168, 170, Sociology 143A, 145B, 146, 156, 175, 185, Women's Studies 102

Four courses to fulfill Area Studies Requirement .....16

#### Area Studies Requirement

Four courses: three of the four must be selected within one region, and from at least two of three groups (History, Social Analysis, Culture and Literature); the fourth course may be selected from any region.

##### Western Europe

*History:* History 140, 141, 142, 144, 145, 146A, 146B, 147A, 147B, 147C, 151D  
*Social Analysis:* Geography 123, Political Science 137, 147

*Culture and Literature:* French 107N, 108, 120, 121, 133, German 115A, 115B, 118B, 118C, 118E, 120, 126, 141, 142C, 143, 150, 185, English 137, 155C, Italian 120A, 120B, Spanish 137N, 139, 140N, 141, 142, 148, 157, 170

##### Russian and East/Central Europe

*History:* History 138B, 138C, 143

*Social Analysis:* Geography 124, Political Science 136, 141, 143, 144

*Culture and Literature:* Russian 123, 129, 130, 131, 143, 151

##### Asia and the Pacific

*History:* History 191E, 191F, 194C, 194D, 196B

*Social Analysis:* Anthropology 143A, 143B, 147, 148A, 148B, 149B, Geography 126, Political Science 133, 138, 148A, 148B, Sociology 147

*Culture and Literature:* Art History 163C, Chinese 104, 105, 110, Japanese 103, 104, 106, 107, 131, 132, 133, 135, 136, Dramatic Art 154, East Asian Studies 113

##### Latin and South America

*History:* History 161B, 162, 163B, 164, 165, 166B, 168

*Social Analysis:* Anthropology 144, 145, 146, Chicana/o Studies 130

*Culture and Literature:* African American and African Studies 153, Communication 152, Spanish 149, 155, 172

##### Africa and the Middle East

*History:* History 115A, 115B, 115C

*Social Analysis:* African American and African Studies 110, Anthropology 140A, 140B, 142, Political Science 134, 146, 149

*Culture and Literature:* African American and African Studies 162, Art History 150

**Total units for the major .....72-105**

**Major Adviser.** E. Goldman (*Political Science*).

## Courses in International Relations (IRE)

### Lower Division Courses

**1. Global Interdependence (4) I, III.** Nincic, Goldman

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.

**98. Directed Group Study (1-5) I, II, III.** The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**131. Ocean Politics (4) III.** Goldman

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) I, II, III.** 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) I, II, III.** The Staff (Committee Chairperson in charge) 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) II-III.** Goldman and staff

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.)

**198. Directed Group Study (1-5) I, II, III.** The Staff

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

## Internship

See Internship Program below; also UC Davis Washington Center

## Internship Program

Albert A. Harrison, Ph.D., Director  
The Internship and Career Center 2nd Floor, South Hall (530-752-2855)

### Program Areas

*Agricultural and Environmental Sciences*

Joe J. Stasulat, Program Manager

*Education and Graduate Placement*

Kathi Shull, Coordinator

*Engineering and Physical Sciences*

Linda R. Hughes, Program Manager

*Health and Biological Sciences*

Linda R. Hughes, Program Manager

*Liberal Arts*

Marti Hanna, Coordinator

Marcie Kirk Holland, Coordinator

Sandra McDonald, Coordinator

Michael Rolph, Coordinator

### Internship Experience

The Internship and Career Center facilitates a campuswide 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)

Juliana Schiesari, Ph.D., Program Director

Department Office (French and Italian), 522 Sproul Hall (530-752-0830)

### Faculty

Antonella Bassi, M.A., Lecturer

JoAnn Cannon, Ph.D., Professor

Dennis J. Dutschke, Ph.D., Professor

Gustavo Foscarini, M.A., Lecturer

Jay Grossi, M.A., Lecturer

Juliana Schiesari, Ph.D., Professor (*Italian, Comparative Literature*)

### 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 a 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 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:

|                                                        |      |
|--------------------------------------------------------|------|
| <b>Preparatory Subject Matter</b> .....                | 0-24 |
| Italian 1, 2, 3, 4, 5, and 9 (or the equivalent) ..... | 0-24 |

|                                   |    |
|-----------------------------------|----|
| <b>Depth Subject Matter</b> ..... | 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 recom-

mended) 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.*

|                                        |       |
|----------------------------------------|-------|
| <b>Total Units for the Major</b> ..... | 36-60 |
|----------------------------------------|-------|

### Recommended

One year of study abroad with the Education Abroad Program or college Latin or a Romance Language.

**Major Adviser.** D. Dutschke.

### Minor Program Requirements:

|                           |    |
|---------------------------|----|
| <b>Italian</b> .....      | 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, and (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).

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## 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) I, II, III.** Foscarini in charge 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.)

**2. Elementary Italian (5) I, II, III.** Foscarini in charge Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

**3. Elementary Italian (5) I, II, III.** Foscarini in charge

Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.

**4. Intermediate Italian (3) I, II, III.** Director in charge 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.

**5. Intermediate Italian (3) I, II, III.** Director in charge

Lecture/discussion—3 hours. Prerequisite: course 4 or the equivalent. 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.

**8A. Italian Conversation (3) I, III.** The Staff Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

**8B. Italian Conversation (3) II.** The Staff

Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only.)

**9. Reading Italian (3) I, II, III.** Director in charge 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 a means of strengthening the student's command of the Italian language.

**50. Studies in Italian Cinema (4) II.** Cannon 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.

**\*90X. Lower Division Seminar (1-2) I, II, III.**

The Staff 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) I, II.** The Staff Primarily intended for lower division students. (P/NP grading only.)

### Upper Division Courses

**101. Advanced Conversation, Composition, and Grammar (4) I.** The Staff

Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.



**\*104. Italian Translation and Style (4) III.**

Dutschke

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.

**105. Introduction to Italian Literature (4) II.**

The Staff

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.

**107. Survey of Italian Culture and Institutions (4) III. Foscarini**

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.

**108. Contemporary Issues in Italian Culture and Society (4) I. Bassi**

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.

**112. Medieval and Renaissance Poetry:**

**St. Francis to Petrarch (4) I. Dutschke**  
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.

**113. Dante Alighieri, *Divina Commedia***

**(*Inferno, Purgatorio, Paradiso*) (4) III. Dutschke**  
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.

**\*114. Boccaccio, *Decameron*, and the****Renaissance *Novella* (4) II. Dutschke**

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.

**115A. Studies in the Cinquecento (4) III.**

Schiesari

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.

**\*115B. Italian Literature of the Renaissance and the Baroque: From Cellini to Marino (4) III. The Staff**

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.

**\*115C. Italian Drama from Machiavelli to the Enlightenment (4) I. Schiesari**

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.

**\*115D. Early Modern Italian Lyric (4) I. Schiesari**  
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.

**\*118. Italian Literature of the Eighteenth Century (4) I. The Staff**

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.

**\*119. Italian Literature of the Nineteenth Century (4) II. The Staff**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy, including Manzoni, Verga, and *Verismo*. GE credit: ArtHum.

**120A. Italian Literature of the Twentieth Century: The Novel (4) III. Cannon**

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.

**\*120B. Italian Literature of the Twentieth Century: Poetry and Drama (4) I. Cannon**

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.

**\*131. Autobiography in Italy (4) III. Schiesari**

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 include Petrarch, Tasso, Casanova, Alfieri, Zvevok, Sibilla Aleramo and Primo Levi. Offered in alternate years. GE credit: ArtHum.

**\*139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) II. Dutschke**

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.

**\*140. Italian Literature in English Translation: Dante, *Divine Comedy* (4) I. Dutschke**

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.

**\*141. Culture, Gender and the Italian Renaissance (4) II. Schiesari**

Lecture/discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Critical analysis of texts from the Italian Renaissance. Primary concern focuses on issues such as "the dignity of Man;" education and gender politics; "high" and "low" culture and its relation to literary practices. GE credit: ArtHum, Div, Wrt.

**\*142. Masterpieces of Modern Italian Narrative (4) III. Cannon**

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.

**145. Special Topics in Italian Literature (4) I, II, III. The Staff (Director in charge)**

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.

**150. Studies in Italian Cinema (4) II. Cannon**

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.

**\*190X. Upper Division Seminar (1-2) I, II, III.**

The Staff (Chairperson in charge)

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) I, II, III, IV. The Staff (Director in charge)**

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) I, II, III. The Staff**

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) I, II, III. Staff (Director in charge)**

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) I, II, III. The Staff**

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) I, II, III. Foscarini**

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.)

**198. Directed Group Study (1-4) I, II, III.**

The Staff (Director in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced****Undergraduates (1-5) I, II, III. The Staff (Director in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****297. Individual Study (1-5) I, II, III. The Staff (Director in charge)**

Prerequisite: graduate standing or consent of instructor.

**298. Group Study (1-5) I, II, III. The Staff (Director in charge)**

Prerequisite: graduate standing or consent of instructor.

**299. Research (1-12) I, II, III. The Staff (Director in charge)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III.

The Staff (Director in charge)

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

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## Japanese

**See East Asian Languages and Cultures**

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## Jewish Studies

(College of Letters and Science)

The interdisciplinary minor in Jewish Studies provides an introduction to the study of Jewish culture, thought, history and literature, primarily in the modern period. Students are introduced to a broad range of methodologies and critical concepts in these areas. The minor provides insight into the relation between Jewish identities, histories, and representations and those of the cultures in which Jews throughout the world find themselves. The minor is sponsored by the Humanities Program.

### Minor Program Requirements

UNITS

**Jewish Studies** .....20

Religious Studies 23.....4

Upper division courses selected from the following list, with at least one in each category .....16

*(a) Religion:*

Religious Studies 122, 124, 125

*(b) Representations, Language, and Identity:*

Comparative Literature 147, English 179, German 141, Hebrew 100, 101, 102, Humanities 118, 119, Russian 159, Sociology 130, 195

*(c) Histories:*

History 142, 143, 144A, 144B, 173

Note: Students are encouraged to participate in the Education Abroad Program in Israel. Courses taken in EAP may, with an adviser's concurrence, be approved for credit in the minor.

**Advising.** Humanities Program (530-752-9934).

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## Land, Air, and Water Resources

(College of Agricultural and Environmental Sciences)

Dennis E. Rolston, Ph.D., Chairperson of the Department

Miguel A. Marino, Vice Chairperson, Hydrology

Robert J. Zasoski, Ph.D., Vice Chairperson, Soils and Biogeochemistry

\_\_\_\_\_, Ph.D., Vice Chairperson, Atmospheric Science

Department Office, 151 Hoagland Hall (530-752-1406)

World Wide Web: <http://lawr.ucdavis.edu>**Faculty—Soils and Biogeochemistry***Office: 151 Hoagland Hall (530-752-1406)*Conrad J. Bahre, Ph.D., Professor (*Environmental and Resource Sciences*)Caroline S. Bledsoe, Ph.D., Professor (*Soil Science*)William H. Casey, Ph.D., Professor (*Aqueous Geochemistry*)Randy A. Dahlgren, Ph.D., Associate Professor (*Soil Mineralogy*)William R. Horwath, Ph.D. Assistant Professor (*Soil Biogeochemistry*)André E. Läuchli, Ph.D., Professor (*Plant Nutrition*)Alexandra Navrotsky, Ph.D., Professor (*Chemical Engineering and Materials Science*)James H. Richards, Ph.D., Professor (*Plant Nutrition*)Dennis E. Rolston, Ph.D., Professor (*Soil Science*)Kate M. Scow, Ph.D., Associate Professor (*Soil Science*)Wendy Kuhn Silk, Ph.D., Professor (*Hydrologic Science*)Michael J. Singer, Ph.D., Professor (*Soil Science*)Randal J. Southard, Ph.D., Professor (*Soil Genesis/Morphology*)Joe J. Stasulat, Ph.D., (*Environmental and Resource Sciences*)Robert J. Zasoski, Ph.D., Professor (*Soil Science*)**Emeriti Faculty**

Francis E. Broadbent, Ph.D., Professor Emeritus

Richard G. Burau, Ph.D., Professor Emeritus

C.C. Delwiche, Ph.D., Professor Emeritus

Emanuel Epstein, Ph.D., Professor Emeritus

Gordon L. Huntington, Ph.D., Lecturer Emeritus

Donald N. Munns, Ph.D., Professor Emeritus

H. Michael Reisenauer, Ph.D., Professor Emeritus

Victor V. Rendig, Ph.D., Professor Emeritus

Harry O. Walker, Ed.D., Senior Lecturer Emeritus

**Affiliated Faculty**

Roland D. Meyer, Ph.D., Cooperative Extension Specialist

G. Stuart Pettygrove, Ph.D., Cooperative Extension Specialist

**Faculty—Atmospheric Science***Office: 151 Hoagland Hall (530-752-1406)*Cort Anastasio, Ph.D., Assistant Professor (*Tropospheric Chemistry*)John J. Carroll, III, Ph.D., Professor (*Meteorology*)Robert G. Flocchini, Ph.D., Professor (*Environmental and Resource Sciences*)Richard D. Grotjahn, Ph.D., Professor (*Atmospheric Science*)Terrence R. Nathan, Ph.D., Associate Professor (*Atmospheric Science*)Kyaw Tha Paw U, Ph.D., Professor (*Atmospheric Science*)Roger H. Shaw, Ph.D., Professor (*Meteorology*)Marlyn L. Shelton, Ph.D., Professor (*Atmospheric Science*)Su-Tzai Soong, Ph.D., Associate Professor (*Atmospheric Science*)Bryan C. Weare, Ph.D., Professor (*Meteorology*)**Emeriti Faculty**

Thomas A. Cahill, Ph.D., Professor Emeritus

Kinsell L. Coulson, Ph.D., Professor Emeritus

**Affiliated Faculty**Richard L. Snyder, Ph.D., Lecturer (*Atmospheric Science*) and Cooperative Extension Specialist**Faculty—Hydrology***Office: 113 Veihmeyer Hall (530-752-0453)*Graham E. Fogg, Ph.D., Professor (*Hydrogeology*)Mark E. Grismer, Ph.D., Professor (*Hydrologic Science, Biological and Agricultural Engineering*)Jan W. Hopmans, Ph.D., Professor (*Water Management*)Theodore C. Hsiao, Ph.D., Professor (*Hydrologic Science*)Miguel A. Mariño, Ph.D., Professor (*Hydrologic Science, Civil and Environmental Engineering*)Carlos E. Puente, Ph.D., Professor (*Hydrology*)Susan Ustin, Ph.D., Associate 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

Donald W. Grimes, Ph.D., Lecturer Emeritus

Robert M. Hagan, Ph.D., Professor Emeritus

Delbert W. Henderson, Ph.D., Professor Emeritus

Allen W. Knight, 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

Kenneth K. Tanji, Sc.D., Professor Emeritus

**Affiliated Faculty**David, A. Goldhamer, Ph.D., Lecturer (*Hydrologic Science*) and Cooperative Extension SpecialistStephen Grattan, Ph.D., Lecturer (*Hydrologic Science*) and Cooperative Extension SpecialistBlaine R. Hanson, Ph.D., Lecturer (*Hydrologic Science*) and Cooperative Extension Specialist

Thomas Harter, Ph.D., Cooperative Extension Specialist

Terry L. Prichard, M.S., Lecturer (*Hydrologic Science*) and Cooperative Extension SpecialistLawrence J. Schwankl, Ph.D., Lecturer (*Hydrologic Science*) and Cooperative Extension Specialist

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, resource, soil and water science, hydrology, and water engineering. Teaching and research focus on both agricultural 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 Resource Sciences, Hydrology, and Soil and Water Science.

**Advising Center** is located in 148 Hoagland Hall (530-752-1669).

**Graduate Study.** Graduate work offered in the area of resource sciences is Atmospheric Science, Hydrologic Sciences, and Soil Science. Detailed information can be obtained from graduate advisers for these areas and the *Graduate Announcement*.

**Courses.** See courses listed under Atmospheric Science, Hydrologic Sciences, Hydrology, Environmental and Resource Sciences, and Soil Science.

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## Landscape Architecture

(College of Agricultural and Environmental Sciences)

Dean MacCannell, Ph.D., Chairperson

Department Office, 142 Walker Hall (530-752-3907)

**Faculty**

Nigel J. R. Allan, Ph.D., Professor

Sharon Collinge, Ph.D., Assistant Professor

Mark Francis, M.L.A., Professor

Dean MacCannell, Ph.D., Professor

E. Byron McCulley, B.S.L.A., Lecturer

Edward S. McNeil, M.L.A., Lecturer

Patsy E. Owens, M.L.A., Assistant Professor

Heath Schenker, M.A., Associate Professor

Robert L. Thayer, Jr., M.A., Professor

**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 1996.

**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, 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 Environmental Design Advising Center or the Landscape Architecture major adviser for further information, 152 Walker Hall (530-752-1165).

**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:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

### UNITS

|                                                                                                                                                                                                             |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                                                                                                                                | <b>8</b>     |
| English 1, 3, 18, 19, 101, 104A, 104B, 104C, 104D, or 104E .....                                                                                                                                            | 4            |
| Communication 1 .....                                                                                                                                                                                       | 4            |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                     | <b>61-69</b> |
| Biological sciences (Biological Sciences 1A, 10) .....                                                                                                                                                      | 4-5          |
| Two courses from Biological Sciences 1C, Chemistry 2A or 10, Computer Science Engineering 10, 15, 30, Geology 1, Geography 1, Mathematics 16A, Physics 1A, 5A, 7A, 10, Soil Science 10, Statistics 13 ..... | 7-10         |
| Environmental Horticulture 6 .....                                                                                                                                                                          | 3            |
| Two courses from Art Studio 2, 5, 16, 142, Design 125, any course from History, Music, Dramatic Art, Philosophy, Art History, language or literature .....                                                  | 8-10         |
| One course from Landscape Architecture 2, Geography 2 or 10 .....                                                                                                                                           | 3-4          |
| Two courses from Anthropology 2, 3, 20, 21, Economics 1A, 1B, Psychology 1, Political Science 1, 2, 3, 4, 5, 7, Sociology 1, 2, 3, 4, 5, or 25 .....                                                        | 8-10         |
| Introductory landscape architecture, Landscape Architecture 21, 23, 30, 40, 50, 60, 70 .....                                                                                                                | 27           |
| <b>Breadth/General Education</b> .....                                                                                                                                                                      | <b>0-24</b>  |
| See General Education requirement                                                                                                                                                                           |              |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                           | <b>48-49</b> |
| Design field studio, Landscape Architecture 170 .....                                                                                                                                                       | 12           |
| Select at least three studios from Landscape Architecture 180/181 or 191 .....                                                                                                                              | 14-15        |
| Senior project, Landscape Architecture 193A, 193B .....                                                                                                                                                     | 7            |
| Graphics/communications, Landscape Architecture 120 or 122 .....                                                                                                                                            | 4            |
| Technology/professional practice, Landscape Architecture 160, 161 .....                                                                                                                                     | 8            |
| Proseminar in landscape architecture, Landscape Architecture 190 (three quarters) .....                                                                                                                     | 3            |
| Internship (Landscape Architecture 192) recommended.                                                                                                                                                        |              |

|                                                                                                    |             |
|----------------------------------------------------------------------------------------------------|-------------|
| <b>Restricted Electives</b> .....                                                                  | <b>32</b>   |
| Natural sciences, one of Environmental Horticulture 105, 133, Evolution and Ecology 121, 138 ..... | 4           |
| Select 24 units of upper division courses in consultation with adviser .....                       | 24          |
| Environmental awareness (Psychology 144) .....                                                     | 4           |
| <b>Unrestricted Electives</b> .....                                                                | <b>0-31</b> |
| <b>Total Units for the Major</b> .....                                                             | <b>180</b>  |

**Major Adviser.** H. Schenker.

**Advising Center** is located in 152 Walker Hall (530-752-1165).

**Graduate Study.** Refer to the Graduate Studies chapter of this catalog.

## Courses in Landscape Architecture (LDA)

### Lower Division Courses

#### \*1. Landscape Meaning (4) I. Francis

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.

#### 2. Place, Culture and Community (4) II. MacCannell

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.

#### 21. Landscape Drafting and Visualization (4) I. McNiel and staff

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.

#### 23. Computer Graphics for Landscape Architecture (4) II, III. The Staff

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.

#### 30. History of Landscape Architecture (4) III. Schenker

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.

#### 40. Introduction to Landscape Architecture (3) I. The Staff

Lecture—3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces. GE credit: ArtHum or SocSci, Wrt.

#### 50. Site Ecology (4) III. Collinge

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A 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. Not open for credit to students who have taken course 153. GE credit: SciEng.

#### 60. Technology I: Grading and Drainage (4) III. McCulley

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.

#### 70. Basic Landscape Design Studio (4) II. Thayer, Schenker

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.

### Upper Division Courses

#### 120. Advanced Computer Applications (4) III. McNiel

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.

#### 122. Advanced Communication in Landscape Architecture (4) III. The Staff

Studio—8 hours; field trips. Prerequisite: course 1, 30, 170 and junior standing in the Landscape Architecture major. Advanced concepts and methods of personal and group communication including group process, participatory methods, written and verbal presentation in landscape architecture.

#### \*155. Plants in the Cultural Environment (3) II. The Staff

Lecture—3 hours. Prerequisite: Biological Sciences 10. Cultural parameters of selecting plants for use in environmental design and planning. Contemporary themes in climate, energy and resource conservation, low maintenance, aesthetics, edible landscapes, historic preservation, native plants, specialized gardens, and computerized plant selection.

#### 160. Technology II: Construction Materials and Detailing (4) II. McCulley

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.

#### 161. Technology III: Professional Practice and Construction Documents (4) I. McCulley

Studio—8 hours. Prerequisite: course 160. Priority given to Landscape Architecture majors. 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. Not open for credit to students who have taken course 134.

#### 168. Mountain Landscapes and Life (3) III. Allan

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 (12) I. Francis, Schenker and staff

Lecture—6 hours; studio—12 hours. Prerequisite: course 1, 30, 70 and junior standing in the Landscape



Architecture major. Intensive study of current topics in landscape architecture, focusing on relationships between environmental, social, and cultural systems on the land. Comprehensive field study and problem solving experience. Topics and sites will vary. Extended field trips will be arranged, ranging from 1 to 10 days.

**180A. Special Topics in Landscape Architecture: Postmodern Landscapes (2) III.** MacCannell

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.

**\*180B. Special Topics in Landscape Architecture: Poetics and Problems of Landscape Architecture History (2) II.** Schenker  
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture and Design majors. Historic examples of landscape design and encouragement of critical thinking about the “uses” of these precedents in contemporary landscape architecture. Offered in alternate years.

**\*180C. Special Topics in Landscape Architecture: Art of the Environment (2) III.** Schenker

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.

**\*180D. Special Topics in Landscape Architecture: Advanced Technology (2) I.** McCulley

Lecture—2 hours. Prerequisite: courses 60 and 160 or consent of instructor. Specialized areas of advanced technology related to site design and construction. Understanding of the concepts, resources and skills necessary to develop these areas in professional practice. Offered in alternate years.

**\*180E. Special Topics in Landscape Architecture: Transit Facility Design (2) II.** McCulley

Lecture—2 hours. Prerequisite: courses 1, 23 and 60 or consent of instructor. Specialized area of transit facility design. Concepts, skills and resources necessary to incorporate into professional practice. Offered in alternate years.

**\*180F. Special Topics in Landscape Architecture: Landscape Ecology (2) II.** Collinge

Lecture—2 hours. Prerequisite: course 50 or 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. Offered in alternate years. Not open for credit to students who have taken course 183.

**180G. Special Topics in Landscape Architecture: Regional Land Planning (2) II.** McNiel

Lecture—2 hours. Prerequisite: upper division standing. Theories, methods and resources used in large scaled landscape analyses for orderly settlement, preservation or management of the land. Integration of natural, cultural and experiential data into decision making. Offered in alternate years.

**180H. Special Topics in Landscape Architecture: The Bioregional Landscape (2) I.** Thayer

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) III.** Thayer

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.

**\*180J. Special Topics in Landscape Architecture: Community Participation in Design (2) III.** Owens

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.

**\*180K. Special Topics in Landscape Architecture: Social Factors in Landscape Architecture (2) III.** Owens

Lecture—2 hours. Prerequisite: Psychology 144 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.

**180L. Special Topics in Landscape Architecture: Public Open Space (2) II.** Francis  
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) III.** Francis

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) I.** The Staff  
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) II.** The Staff

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.

**181A. Postmodern Landscapes Design and Planning Studio (3) III.** MacCannell

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.

**\*181B. Poetics and Problems of Landscape Architecture History and Design and Planning Studio (3) II.** Schenker

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180B concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180B. Offered in alternate years.

**\*181C. Art of the Environment Design and Planning Studio (3) III.** Schenker  
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.

**\*181D. Advanced Technology Design and Planning Studio (3) I.** McCulley  
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180D concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180D. Offered in alternate years.

**\*181E. Transit Facility Design and Planning Studio (3) II.** McCulley  
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180E concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180E. Offered in alternate years.

**\*181F. Landscape Ecology Design and Planning Studio (3) II.** Collinge  
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180F concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180F. Offered in alternate years. Not open for credit to students who have taken course 183.

**181G. Regional Land Planning Design and Planning Studio (3) II.** McNiel  
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180G concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with 180G. Offered in alternate years.

**181H. The Bioregional Landscape Design and Planning Studio (3) I.** Thayer  
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) III.** Thayer  
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) III.** Owens  
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.

**\*181K. Social Factors in Landscape Architecture Design and Planning Studio (3) III.** Owens  
Studio—6 hours; one field trip required. Prerequisite: course 170 and Psychology 144; course 180K concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180K. Offered in alternate years.

**181L. Public Open Space Design and Planning Studio (3) II.** Francis  
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) III.** Francis  
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) I. The Staff (Chair in charge)  
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) II. The Staff (Chair in charge)  
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.

**190. Proseminar in Landscape Architecture**

(1) I, II, III. Collinge, Francis and staff  
Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)

**191. Workshop in Landscape Architecture**

(2-12) I, II, III. The Staff (Chairperson in charge)  
Seminar—1 hour workshop—3 hours. Prerequisite: courses 11 and 40, upper division standing and consent of instructor. Faculty-initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated for credit for a total of 12 units.

**192. Internship in Landscape Architecture**

(1-12) I, II, III. The Staff  
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) II. McNiel  
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.)

**193B. Senior Project in Landscape Architecture**

(4) III. McNiel  
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.)

**197T. Tutoring in Landscape Architecture**

(1-5) I, II, III. The Staff  
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) I, II, III. The Staff (Master Adviser in charge)  
Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates in Landscape Architecture**

(1-5) I, II, III. The Staff (Master Adviser in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****\*201. Theory and Philosophy of the Designed Environment**

(4) III. Francis  
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.

**202. Methods in Design and Landscape Research**

(4) III. Owens  
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.

**\*203. Perceptions of Environmental Quality**

(4) III. Thayer  
Seminar—4 hours. Prerequisite: Psychology 144 or consent of instructor. Examines human perceptual responses to the physical environment beginning with aesthetics and leading to more complex cognitive evaluations and personal and social interpretations of environmental quality. Discusses means by which intervention by design can affect human/environmental perception, cognition, and behavior. Offered in alternate years.

**\*204. Case Studies in Landscape Design and Research**

(4) I. Schenker  
Laboratory—8 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Case studies in landscape design and research have as their primary goal the exposure of the student to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Offered in alternate years.

**\*210. Advanced Landscape Architecture Studio**

(4) The Staff  
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) II. MacCannell  
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.

**\*240. Rural Landscape Planning and Design**

(3) The Staff  
Seminar—3 hours. Prerequisite: course 181 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural farmsteads, subdivisions, commercial zones, and small communities in their challenge of economic and social change. Concern is with runaway growth, shrinking populations, shifting economies, and lack of public funds or consensus. Offered in alternate years.

**\*250. Technology and Sustainable Landscape**

(3)  
Seminar—3 hours. Prerequisite: course 184 or the equivalent; graduate standing or consent of instructor. Explores the relationship between technology and landscape quality. Typology of technological landscape adaptations is presented and impacts of these technologies are discussed. Emphasizes a theoretical understanding of technological change and a practical approach to sustainable technologies. Offered in alternate years.

**280. Landscape Conservation**

(3) I. Collinge  
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.

**\*290. Graduate Seminar in Landscape Architecture**

(2) I, II, III. The Staff  
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) I, II, III. The Staff  
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) I, II, III. The Staff  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Directed Individual Research for Graduate Students**

(1-5) I, II, III. The Staff  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Latin

See Classics

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## Law, School of

Bruce A. Wolk, J.D., Dean

Rex R. Perschbacher, J.D., Associate Dean  
(Academic Affairs and Research)

Antonia E. Bernhard, J.D., Assistant Dean  
(Student Affairs)

Mary A. Grivna, B.A., Assistant Dean (Administration)

George S. Grossman, LL.B., M.S.L.S., Director  
(Law Library)

Dean's Office, 1011 Martin Luther King, Jr. Hall  
(530-752-0243)

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**Faculty**

Diane M. Amann, J.D., Acting Professor

Vikram Amar, J.D., Acting Professor

John D. Ayer, J.D., LL.M., Professor

Antonia E. Bernhard, J.D., Lecturer

Alan E. Brownstein, J.D., Professor

Carol S. Bruch, J.D., Professor

Susan D. Christian, J.D., Lecturer

Joel C. Dobris, LL.B., Professor

Holly G. Doremus, J.D., Acting Professor

Harrison C. Dunning, LL.B., Professor

Floyd F. Feeney, LL.B., Professor

Arturo Gándara, J.D., Professor

Michael J. Glennon, J.D., Professor

Gary S. Goodpaster, J.D., Professor

George S. Grossman, LL.B., M.S.L.S., Professor

Sarah D. Gray, Ph.D., Professor (*Human Physiology*)

Robert W. Hillman, J.D., Professor

Edward J. Imwinkelried, J.D., Professor

Margaret Z. Johns, J.D., Senior Lecturer and Director  
of Legal Writing

Kevin R. Johnson, J.D., Professor

Thomas W. Joo, J.D., Acting Professor

Ellen R. Jordan, J.D., Professor

Friedrich K. Juenger, J.D., Professor

Leslie A. Kurtz, J.D., Professor

Evelyn A. Lewis, J.D., Professor

Millard Murphy, J.D., Lecturer

John B. Oakley, J.D., Professor

Amagda Perez, J.D., Lecturer

Rex R. Perschbacher, J.D., Professor

Jill Peterson, J.D., Lecturer

John W. Poulos, J.D., Professor

Daniel L. Simmons, J.D., Professor

James F. Smith, J.D., Senior Lecturer  
 Martha S. West, J.D. Professor  
 Bruce A. Wolk, J.D., Professor  
 Richard C. Wydick, LL.B., Professor

### Emeriti Faculty

Homer G. Angelo, J.D., LL.M., Professor Emeritus  
 Edward L. Barrett, Jr., J.D., Professor Emeritus  
 Florian Bartosic, B.C.L., LL.M., Professor Emeritus  
 Daniel J. Dykstra, LL.B., S.J.D., Professor Emeritus  
 Daniel Wm. Fessler, J.D., S.J.D., Professor Emeritus  
 James E. Hogan, LL.B., Professor Emeritus  
 Pierre R. Loiseau, LL.B., LL.M., Professor Emeritus  
 Raymond I. Parnas, J.D., LL.M., S.J.D., Professor Emeritus  
 Edward H. Rabin, LL.B., Professor Emeritus  
 Mortimer D. Schwartz, J.D., LL.M., 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. Impotatn 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.)

##### 201A-201B. Property (2-3)

Discussion—2-3 hours. Study of doctrines and concepts of property law with primary emphasis on real property. The estates in land system, the landlord-tenant relationship, conveyancing, and private and public land use control. (Deferred grading only, pending completion of sequence.)

##### 202A-202B. Contracts (3-2)

Discussion—3-2 hours. Examines the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry into the means by which traditional doctrine adjusts—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.)

##### 203A-203B. Civil Procedure (3-2)

Discussion—3-2 hours. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Topics covered include the relation between federal and state courts; the power of courts over persons, property, and subject matter (jurisdiction); the scope of litigation (joinder of claims and parties); preparation for trial through pleadings, discovery, and pretrial; devices for resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial court's disposition. (Deferred grading only, pending completion of sequence.)

##### 204A-204B. Torts (3-2)

Discussion—3-2 hours. Legal concepts which apply to actions brought by litigants who seek relief for injury. Intentional and unintentional invasions of personality and property. Analysis of civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. (Deferred grading only, pending completion of sequence.)

##### 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. In particular, course treats judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be addressed.

##### 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 (1)

Discussion—0.5 hours; laboratory—0.5 hours. Description of the evolution and use of sources of law and secondary authority. Class discussion followed by research exercises.

##### 208. Legal Writing (2)

Lecture—2 hours. Instruction in the form and substance of writing. A variety of law-related documents will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

### Second and Third Year Courses

The second- and third-year courses fall into subject areas as shown here

- (a) General courses: 212, 217, 222, 226, 231, 234, 240, 241, 244, 250, 254, 258A, 258B, 259, 266, 267, 268, 277, 280, 286A, 286B, 292, 296, 408
- (b) Business Law: 215, 228, 232, 236A, 236B, 238, 243, 253, 262, 269, 270, 271, 274, 284, 295
- (c) Constitutional Law: 218, 257, 288
- (d) Criminal Law: 210, 213, 227A, 227B, 245, 276
- (e) Estate Planning: 214, 221, 223
- (f) Family Law: 225, 272, 273
- (g) International Comparative and Foreign Law: 213, 224, 230, 233, 237, 248, 249, 252, 257, 270, 279, 291
- (h) Labor and Employment Relations Law: 251, 255, 260
- (i) Procedure and Jurisdiction: 242, 246, 275, 283
- (j) Environmental Law and Natural Resources: 230, 232, 256, 264, 265, 282, 285, 287, 289, 294, 409
- (k) Public Law: 235, 271, 281, 282, 293
- (l) Skills and Litigation: 211, 219, 229, 237, 239, 252, 261, 263, 278, 297, 409, 410A, 410B, 412, 413, 414, 415
- (m) Taxation: 214, 220, 228, 238, 247
- (n) Individual and Group Study: 298, 299, 411, 416, 417, 418, 419, 495
- (o) Clinical Programs: 420, 425, 430, 440, 445, 450, 455, 460, 470, 480

##### 209. Patent Law (2)

Discussion—2 hours. United States patent law. Review of the historic and constitutional and statutory basis for patents, structure of U.S. Patent and Trademark Office and patenting procedures. Statutory subject matter examined through review of standards of utility, novelty, statutory bars, priority, nonobviousness, description and enablement. Infringement of patents, defenses to infringement and remedies. Recent changes to U.S. systems, particularly creation of Federal Circuit Court of Appeals and implementation of international treaties on patent law.

##### 210. Criminal Justice Administration Seminar (2)

Seminar—2 hours. Comparison of American and European criminal procedure, particularly the differing roles of the prosecutor, defense counsel, and the judge. Class paper may satisfy the advanced legal writing requirement. Limited enrollment.

##### 211. Negotiations and Dispute Resolution (2)

Discussion—2 hours. Negotiation and mediation skills and theories. Students do five or more practice negotiations or mediations to develop skills, perceptions, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment.

##### 212. Law and the Mental Health System (3)

Discussion—3 hours. Concept of mental illness, the regulation of mental health professionals, the patient-professional relationship, mental health professionals as expert witnesses, and deprivation of liberty and property based upon mental disorder. With consent of instructor, student may either write a paper or take a final examination. Required prerequisite to course 241.

##### 213. International Criminal Law Seminar (2)

Seminar—2 hours. Prerequisite: courses 205 and 206. Explores issues that arise when crime acquires an international character; for example, when an offense occurs in or harms more than one nation or when a person accused in one nation is a citizen of another. Topics may include the United States' role in investigating and prosecuting international offenses, and what law, domestic or international, U.S. courts should apply in such cases; the duty of a nation to extradite or prosecute persons accused of breaking the law of another nation; the prosecution of international war criminals in the post-World War II tribunals in Nuremberg and Tokyo and in the current Bosnia and Rwanda tribunals in the Hague; and proposals for a permanent International Criminal Court with jurisdiction over international offenses such as kidnapping, money-laundering, and drug trafficking. In addition to class participation, students are required to write a research paper which will satisfy the advanced legal writing requirement. Limited enrollment.

##### 214. Estate and Gift Taxation (3)

Discussion—3 hours. Prerequisite: course 220; course 221 recommended. Fundamentals of federal transfer taxation, including the estate tax, the gift tax, the generation-skipping tax, and the valuation rules under Chapter 14. May include income taxation of trusts and estates.

##### 215. Business Associations (4)

Discussion—4 hours. Broad survey of the legal rules and concepts applicable to business associations, both public and closely held. Principal attention to the corporate form of organization, although partnerships are also treated briefly. Topics include the planning of business transactions, the process of incorporation, the financing of corporations, the role of managements and shareholders, the federal securities laws, and social responsibility.

##### 216. Criminal Process Reform Seminar (2)

Seminar—2 hours. Consideration of possible reform efforts in criminal justice administration. Guest lecturers. Class presentations by each student. May satisfy advanced legal writing requirement. Limited enrollment.

##### 217. Telecommunications Law (3)

Discussion—3 hours. The economic and administrative regulation of telephony, radio and television broadcasting, and new 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, but other sources of regulation are treated as well, such as related antitrust law and state public utility regulation.

##### 218. Constitutional Law II (3)

Discussion—3 hours. The First Amendment and the Equal Protection Clause. The First Amendment study involves an examination of freedom of speech and assembly, focusing on the various kinds of speech the courts have identified and their constitutional significance: political speech, commercial speech, offensive speech, obscenity, fighting words, and speech constituting a clear and present danger. Attention to issues involving the forum in which speech occurs: prior restraint, overbreadth, vagueness doctrine, and the protection provided symbolic expression. The equal protection study will examine suspect class doctrine involving discrimination on the basis of race,



gender, alienage, and other characteristics, affirmative action, the problem of "invidious motive," state action, and the extent to which the equal protection clause prevents government from burdening the exercises of fundamental rights. If time permits, the Establishment Clause and the Free Exercise Clause will also be considered.

#### 219. Evidence (4)

Discussion—4 hours. The rules regarding the admissibility of testimonial and documentary proof during the trial of civil and criminal cases, including the concept of relevancy, the hearsay rule, the examination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges.

#### 220. Federal Income Taxation (4)

Discussion—4 hours. Introduction to basic principles of federal income taxation. Topics include identification of income subject to tax, gains and losses from property transactions, deductions from income, the timing of income and deductions (tax accounting), and the identity of persons subject to tax on particular items of income.

#### 221. Trusts, Wills and Decedents' Estates (3)

Discussion—3 hours. Study of the law of wills and trusts. Intestate succession; family protection and limits on the power of testation; execution, revocation and revival of wills; will substitutes; inter vivos and testamentary private trusts. May also cover one or more of the following topics: 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. Law of Race Relations Seminar (2)

Seminar—2 hours. Explores the treatment of racial issues throughout American legal history as well as current debates over such issues. Examines various, often conflicting, theoretical approaches to the often oversimplified issue of race. Places current legal issues into a historical context, to evaluate the strength of conflicting legal approaches and to apply legal reasoning to issues that are commonly addressed in political or emotional terms. Grading based on class participation and an original research paper to be presented in class. The advanced legal writing requirement may be satisfied at the discretion of instructor. Limited enrollment.

#### 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. Law and Institutions of European Union (2)

Discussion—2 hours. Study of legal problems of European integration, including the transfer of powers to supranational institutions, their decision making, the role of the Courts of the Communities and discussion of selected areas of European Law.

#### 225. Marital Property (3)

Discussion—3 hours. The California community property system including rights of spouses and treatment of property during marriage; characterization, valuation, and division of property upon termination of marriage by dissolution, nullity, or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditor's rights, and spousal support.

#### 226. Disability Law (3)

Discussion—3 hours. The Americans with Disabilities Act (A.D.A.), the Rehabilitation Act (§504), and the Individuals with Disabilities Education Act (IDEA) as they apply to employment, public accommodations, government services and programs, higher education, and primary and secondary education. Statutory definition of disability, entities subject to the provisions of each Act, the "otherwise qualified" requirement, forms of discrimination, reasonable accommodation and defenses, and the right to a special education for children who qualify under the IDEA.

#### 227A. Criminal Procedure (3)

Discussion—3 hours. Examines U.S. Constitutional constraints on the police function; in particular, on arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineups, and the exclusionary rule.

#### 227B. Advanced Criminal Procedure (3)

Discussion—3 hours. Essential to those who wish to handle criminal cases. In particular, it treats bail, prosecutorial discretion, plea bargaining, trial by jury, and sentencing.

#### 228. Business Planning and Drafting (3)

Discussion—3 hours. Prerequisite: courses 215 and 220, or consent of instructor. Transactions frequently encountered by lawyers representing business clients, emphasizing tax aspects of such transactions. Business and tax strategies, techniques and issues relative to formation of partnerships, limited liability companies, corporations, and other types of business entities. May include discussion of executive compensation, retirement of stock interests, financially troubled, businesses, and acquisitions, dispositions, divisions, and liquidations of businesses. Taught using the problem method and includes significant work drafting a variety of legal documents and/or class presentations.

#### 229. Scientific Evidence (3)

Discussion—3 hours. Prerequisite: course 219. Examines evidence law governing the admission of scientific testimony, and considers trial advocacy in presenting and attacking such testimony. Each student is required to both make an oral class presentation and prepare a research paper dealing with a particular forensic technique. Limited enrollment.

#### 230. International Environmental Law Seminar (2)

Seminar—2 hours. Prerequisite: prior or concurrent enrollment in course 248 or consent of instructor. Examination of international law norms applicable to the protection of the global environment, including air and water resources, flora and fauna, and historical and cultural treasures of international interest. Study of institutions that make and enforce the norms. Special emphasis on implementation and compliance by the United States. Required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

#### 231. Sex-Based Discrimination (3)

Discussion—3 hours. Focuses on legal issues raised by legal and social discrimination between men and women and explores potential remedies drawn from constitutional law, statutory enactments, and common law developments. Includes sex-based discrimination in family law, reproductive rights, educational opportunity, criminal law and employment.

#### 232. Real Estate Finance (3)

Discussion—3 hours. 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. Stresses the practical application of California legal doctrines.

#### 233. Refugee Law Seminar (2)

Seminar—2 hours. Prerequisite: course 292 recommended. Focus on the law concerning the admission of refugees into the United States. Detailed study of the Refugee Act of 1980, which is the major piece of legislation dealing with refugee admission, the international law that fueled the passage of the Act, and the various regulations promulgated by the Attorney General implementing the law. Analysis of the implementation of the Refugee Act and examination of some criticisms of the immigration bureaucracy's implementation of the law. Some topical issues of refugee law, such as gender-based persecution, persecution based on the exercise of reproductive rights, and the persecution of lesbians and gay men. The advanced legal writing requirement may be satisfied at the discretion of the instructor. Limited enrollment.

#### 234. Law and Sexuality (2)

Discussion—2 hours. Focus on legal and social regulation of human sexuality, principally, sexual orientation.

#### 235. Administrative Law (3)

Discussion—3 hours. Administrative due process, agency adjudication, rulemaking, delegation of legislative and judicial review. Emphasis on the federal Administrative Procedure Act, but some comparative aspects of state administrative procedure are presented.

#### 236A. Securities Regulation I (2)

Discussion—2 hours. Prerequisite: course 215 or consent of instructor. Focuses on the Securities Act of 1933 and the Securities Exchange Act of 1934. Topics include domestic and international public offerings, registration statements, exemptions from registration, secondary offerings, market regulation, liability provisions, the definition of a security, enforcement of the securities act, responsibilities of securities lawyers, and transnational securities fraud. Particular attention to problems of small issuers of securities.

#### 236B. Securities Regulation II (2)

Discussion—2 hours. Prerequisite: course 213 or 215, or consent of instructor; course 246A recommended. Principle focus is the Securities Exchange Act of 1934 and the regulation of securities markets. Topics include the evolution of securities markets, market efficiency, continuous reporting, institutional investors, shareholder voting and going-private transactions, regulation of securities markets and securities professionals, responsibilities of securities lawyers, transnational securities fraud, and enforcement of the securities acts.

#### 237. International Transactions and Dispute Resolution (3)

Discussion—3 hours. Legal sources of international trade law (international uniform law instruments such as CISG, international restatements of contract law such as the UNIDROIT Principles of International Commercial Contracts; trade usages such as INCOTERMS and the Uniform Customs and Practices on Documentary Credits issued by the International Chamber of Commerce; domestic law including conflict of laws rules) and selected issues particularly relevant in the international contract practice: precontractual liability; battle of forms; force majeure and hardship; export-import licenses; exemption clauses; liquidated damages. Questions of jurisdiction and enforcement of foreign decisions and to international commercial arbitration as an alternative means of dispute resolution.

#### 238. Corporate Tax (4)

Discussion—4 hours. Prerequisite: course 220. Focus on all aspects of corporate and shareholder taxation, including choice of entity and entity classification; organizational and other transfers from shareholders to corporations; dividends and other corporate distributions to shareholders; distinction between debt and equity; operation and liquidation of corporations; mergers, divisions, acquisitions and other forms of corporate reorganization; subchapter S corporations. Considers historical development of the corporate tax and proposals to integrate the corporate and individual income taxes. It is anticipated that many students will also enroll in course 247.

#### 239. Mediation: Theory and Practice (3)

Discussion—3 hours. This practice-oriented course teaches the basic, practical knowledge necessary to begin a mediation practice. All students will gain a detailed understanding of the mediation process that will enable them to counsel clients knowledgeably about the mediation option and represent clients ably in mediation. All will gain communication skills that will be valuable in working with clients and other attorneys, develop the ability to analyze disputes and understand why negotiations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Stages of mediation: contracting (establishing contact with the parties and explaining the process), developing the issues, working the conflict, resolving the conflict, and close. Limited enrollment.

#### 240. Elections and Political Campaigns (2)

Discussion—2 hours. Constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general

elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest. Satisfies advanced legal writing requirement. Limited enrollment.

**241. Law and Psychiatry Seminar (2)**

Seminar—2 hours. Prerequisite: consent of instructor. Open to medical students participating in the UCDMC Forensic Center of Excellence program, and to law students (third-year students have priority). Advanced seminar on forensic psychiatry for medical and legal professionals. Psychiatric trainees and forensic fellows are paired with law students to work in tandem as a forensic team. Each team is assigned to actual cases that have been adjudicated, although the teams will approach each client as if adjudication has not yet taken place. Cases are evaluated both psychiatrically and legally, so that both team members confront the legal and psychiatric issues presented, and a detailed written psychiatric and legal assessment is prepared. Cases selected to provide a broad array of legal/psychiatric problems and to raise specific critical issues around which psychiatrists and lawyers interact and at times collide. Limited enrollment.

**242. Conflict of Laws (3)**

Discussion—3 hours. Study of transactions with multi-state and international contracts. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Problems practitioners encounter in a wide variety of fields, such as commercial law, family law and personal injury law.

**243. Bankruptcy (3)**

Discussion—3 hours. Survey of the rights and obligations of debtors in trouble, and of their creditors. Most of it concerns proceedings under the Bankruptcy Code. In the first part of the course, an examination of how and why debtors are permitted to get a "fresh start," wiping out their obligations. Later, consideration of how the bankruptcy trustee collects and distributes money to pay creditors' claims. Study of the bankruptcy system as it applies to both individuals and corporations.

**244. Basic Human Physiology (2)**

Discussion—2 hours. Several medical basic science faculty give lectures on the basic anatomy and physiological functioning of the organ systems; basic word roots which underlie medical/scientific terminology are emphasized. Several clinical faculty give lectures on new technologies in medicine and some of the associated legal problems which have arisen. Exams are in the format of simple, simulated medical-legal problems in which students are expected to evaluate medical/scientific data, as well as to determine the kinds of expert witnesses that might be valuable in particular cases. Limited enrollment. (S/U grading only.)

**245. Advanced Substantive Criminal Law (3)**

Discussion—3 hours. Law of conspiracy, corporate criminal liability, business and environmental crimes and associated defenses. With consent of instructor, students may either write a paper or take a final examination.

**246. Federal Jurisdiction (3)**

Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Constitutional and statutory authority of federal courts to adjudicate civil actions arising under federal law or between parties of diverse citizenship examined in contemporary detail, and from the perspective of history and the Constitution. Federal appellate jurisdiction, federal writs in the nature of habeas corpus, abstention, justiciability, and miscellaneous matters affecting attorneys' decisions to seek a federal forum discussed. In addition to careful study of the relevant legislation in light of its history, examines the constitutional themes of separation of powers and federalism as guides to understanding the Supreme Court's leading opinions on the scope of federal jurisdiction.

**247. Taxation of Partnerships and LLC's (3)**

Discussion—3 hours. Most business that is not publicly traded is organized (or should be) under the partnership tax regime. Course examines 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. This includes partnerships, limited liability companies and S corporations. Explores choice of entity issues, identification of entities eligible for pass-through tax treatment and the income tax impact of formation, operation and dissolution of pass-through business entities.

**248. International Law (3)**

Discussion—3 hours. Prerequisite: course 217 recommended. Basic international law concepts such as statehood and recognition; treaty law and customary international law; use of force; human rights and war crimes; expropriation; the relationships between international law and national law; and the jurisprudence of international law.

**249. Comparative Law (3)**

Discussion—3 hours. Comparative perspective for students of American law. After an initial look at the uses of the comparative method, discussions will center around the main differences between common law and civil law and the different styles of legal thinking. Topics include 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 not required.

**250. Jurisprudence Seminar (2)**

Seminar—2 hours. Philosophy of adjudication. Nature of legal interpretation and the relationship between justice and law, with special attention to the problem of how judges should decide hard cases where the content of the law is in doubt. To what extent should a judge's personal convictions about justice affect decisions about the legal rights of the parties to a law suit? Does it matter if the judge is interpreting precedent rather than legislation? Introductory readings of a general and synthetic nature are followed by a detailed study of particular problems and theories of adjudication. Grading based on active class participation and on an original paper. Limited enrollment.

**251. Labor Law (3)**

Discussion—3 hours. Survey of the legislative, administrative, and judicial regulation of labor relations. Focus on the historical development of labor law, the scope of national legislation, union organization and recognition, the negotiation and administration of collective bargaining agreements, legality of strikes, picketing, boycotts, and employer interference with employee-concerted activities. Rights of employees under wrongful discharge theories are contrasted with labor law protections.

**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. Topics include jurisdiction, the enforcement of judgments, the relative merits of arbitration and adjudication, international discovery and international choice-of-law problems. Exercises in international arbitration and mediation.

**253. Products Liability (3)**

Discussion—3 hours. Civil action for harm to the consumer resulting from defective products. Includes manufacturing defects, warning defects and design defects.

**254. American Legal History (2)**

Seminar—2 hours. Historical study of the relationship between legal change and social and political movements. Between 1953 and 1969, the Warren Court made enormous changes involving civil rights, civil liberties, criminal procedure, federal-state relations, and legislative apportionment. These legal developments occurred in the midst of the McCarthy period and the Cold War, the civil rights struggle, the anti-war movement, the popularity of folk music and rock and roll, the beginning of the space age, the Great Society legislative program and economic prosperity. What is the relationship between legal change and social and political change? Broadly, perspectives from politics and culture help to understand the interplay between constitutional adjudication and social and political

change. Focus on the modern Civil Rights Movement and assessment of the influence of law, lawyers, lower courts, and the Movement itself on the Court and the elected branches of government. Emphasis on the need to understand law in its social and historical context. Limited enrollment.

**255. Pension and Employee Benefit Law (3)**

Discussion—3 hours. Federal regulation and taxation of private pensions and employee benefits. Focuses on the Employee Retirement Income Security Act of 1974 (ERISA) and deals with such topics as coverage, vesting, funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, preemption of state law, and a variety of ERISA litigation and fiduciary duty issues. Internal Revenue Code issues such as discrimination in favor of the highly compensated limitations on contributions and benefits, rollovers, early distribution penalties, and minimum distribution rules are also highlighted. Problems surrounding plan terminations are also considered, including bankruptcy issues, Pension Benefit Guarantee Corporation Insurance, and the issue of asset reversions to employers.

**256. Land Use Planning and the California Environmental Quality Act (2)**

Discussion—2 hours. An assessment of the administrative and judicial applications of land planning and development. Topics include zoning, general plans, and related environmental and local government regulation. In addition, course will analyze the role of the California Environmental Quality Act and its application to California land use law.

**257. Legislative Process (2)**

Discussion—2 hours. Fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; the legislative investigative power; lobbying, legislative executive relations; and the legislature's constitutional powers and limitations.

**258A. Professional Responsibility (1)**

Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association Code of Professional Responsibility, the Model Rules of Professional Conduct, and the Code of Judicial Conduct and the law of California. Required of all students for graduation. (S/U grading only.)

**258B. Professional Responsibility (2)**

Discussion—2 hours. Study of lawyers' ethical duties and responsibilities to clients, the courts, third parties, and the legal system. Application of the American Bar Association's Model Code of Professional Responsibility and Model Rules of Professional Conduct and Code of Judicial Conduct. California law studied in more detail than in course 258A and current issues affecting the profession also discussed. Required of all students for graduation.

**259. Feminist Legal Theory Seminar (2)**

Seminar—2 hours. Readings selected from the field of feminist legal theory and examination of the relationship between theory and legal practice in support of women's rights. Students required to help lead class discussions and write a research paper, which will satisfy the advanced legal writing requirement. Limited enrollment.

**260. Employment Discrimination (3)**

Discussion—3 hours. Examination of federal law prohibiting employment discrimination based upon race, color, religion, sex, national origin, age, and sexual orientation. Course will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Art. 1981, Art. 1983, the Equal Pay and Age Discrimination Acts. California fair employment laws will also be discussed.

**261. Judicial Process Seminar (2)**

Seminar—2 hours. Prerequisite: must be taken before or concurrently with the judicial externship (offered fall only). Required for all full-time judicial externs and recommended for part-time judicial externs. Examines a variety of issues concerning the judicial process. The 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. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

**263. Trial Practice (3)**

Discussion—2 hours; laboratory—2 hours. 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, or Thursday evening. Limited enrollment. (S/U grading only.)

**264. Water Law (3)**

Discussion—3 hours. Property rights in surface waters, including riparianism, prior appropriation and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate waters and property rights in ground water. Emphasis on California water law and policy.

**265. Natural Resources Law Seminar (2)**

Discussion—2 hours. Prerequisite: courses 264, 287 recommended (may be taken concurrently). History, policy and law regarding the Colorado Plateau and the Colorado River, "lifeline of the Southwest" and a major source of water for Southern California. Limited enrollment.

**266. Legal Realism and Critical Legal Studies Seminar (2)**

Seminar—2 hours. Between the two World Wars, American scholars and judges developed and implemented a new approach to law, adjudication, and legal education, known as Legal Realism. Focuses on the antecedents of Legal Realism, the struggle over its meaning, its attack on "classical legal thought," its insights, its impact on American judges' understanding of their responsibilities and power, and its influence on modern American legal scholarship by setting the agenda of questions to be answered and by powerfully affecting the Law and Society, the Law and Economics, and especially the Critical Legal Studies (CLS) movement. Limited enrollment.

**267. Civil Rights Law (3)**

Discussion—3 hours. Survey of federal civil rights litigation. Includes civil remedies for racial discrimination and civil rights violations, specifically actions under: 42 U.S.C.A.s 1981, et. seq.; Title VIII of the Civil Rights Act of 1968; and Title II of the Civil Rights Act of 1964.

**268. Jewish Law Seminar (2)**

Seminar—2 hours. The term "Jewish Law" refers to those subjects that would normally be taught in an American law school as they have been approached by the Jewish legal system. This system is based primarily on the Talmud and on the commentaries and decisions that are derived from it. Jewish law is of interest to American law students not for its immediate practical value, but because it is a foreign legal system that is one of the oldest in the world, and one that has faced many of the problems now facing American law. Specifically, although Jewish law is purportedly based on immutable religious law, changing conditions over the centuries have encouraged methods of adaptation that are reminiscent of American constitutional law. Each student will be required to prepare and present a paper that would fulfill the advanced legal writing requirement. Neither a knowledge of foreign languages nor a previous exposure to Jewish law is necessary. Limited enrollment.

**269. Basic Finance (3)**

Discussion—3 hours. Prerequisite: law basic finance course required; or consent of instructor. Gives students exposure to basic techniques of valuation that are part of the standard inventory in good business school. Gives a student helpful background for a range of business-related courses.

**270. 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, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports.

**271. Nonprofit Organizations and Document Drafting (4)**

Discussion—4 hours. Prerequisite: course 215 (may be taken concurrently). Same material as covered in the 3-unit course, but includes significant work drafting a variety of legal documents relative to formation of nonprofit organizations. Focuses on the legal rules and concepts applicable to nonprofit organizations, such as public interest, cultural, religious, educational, and other tax-exempt organizations. Nonprofits from the state law perspective, covering organization and dissolution, operation and governance, fiduciary obligations of officers and directors. Basic taxation of nonprofits, including qualification for exempt status, the inurement and private benefit concepts, limitations on political activities, the unrelated business income, and charitable contributions.

**272. Family Law (3)**

Discussion—3 hours. For students with substantial interest in family law, especially the legal and psychosocial aspects of parent-child relationships. Who is a "parent"? How does the law create, dismantle, and reconstruct parent-child relationships? Should the law respond differently to biological or genetic as opposed to social (adoptive, foster, de facto) parenting? When should the law attend more to a "child's best interests" than to the autonomy and privacy of the child's parents? These issues are explored in the context of decisions about medical care, child abuse and neglect, foster care and adoption, abortion and birth control, alternative reproductive techniques, same sex parenting, child support and custody. The relevance of social science and mental health expertise to these issues is considered.

**273. Current Issues in Family and Marital Property Law Seminar (2)**

Seminar—2 hours. Prerequisite: course 225 or 272. Examination in depth of important current issues in the fields of family and marital property law. Heavy emphasis on law reform, including study and direct observation of the legislative process. Each student selects one issue for development and presentation in the seminar. A research paper or draft bill and supporting analysis is required. A more lengthy paper with additional unit credit may be arranged with consent of instructor to satisfy the advanced legal writing requirement.

**274. Intellectual Property (3)**

Discussion—3 hours. Broad survey of the field of intellectual property, including trademarks, patents, trade secrets, idea protection, unfair competition, and copyright.

**275. Complex Litigation (3)**

Discussion—3 hours. A study of the issues that frequently arise in large complex litigation involving multiple parties and multiple claims. In-depth treatment of topics introduced in the first-year civil procedure course, with emphasis on cutting-edge issues currently the topic of litigation. Topics include complex party joinder, multidistrict federal court litigation, motion practice and sanctions, class action litigation, discovery and "discovery abuse," including privilege and work product claims, judicial management and settlement of litigation, and preclusion (collateral estoppel and res judicata). Not all topics will necessarily be covered in any one semester.

**276. Juvenile Justice (3) II.**

Discussion—3 hours. Legal and philosophical bases of 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. Guest speakers and field trip possible.

**277. Native American Law Seminar (2)**

Seminar—2 hours. Focus on legal relations between Native Americans and the federal and state governments. Topics include rights of indigenous peoples, tribal autonomy, assertion of federal and state authority, economic and technological development of Native American communities, and special protections and rights of terminated tribes, non-recognized tribes and Alaska and Hawaiian natives.

**278. Pretrial Skills (2)**

Discussion—2 hours. Not open to students who have completed or are enrolled in course 297. Course uses a series of role-playing exercises, class discussions and written assignments to introduce students to a set of non-trial skills basic to the practice of law. Course covers client interviewing and counseling, witness interviewing, discovery practice, pleadings, pretrial motions, negotiations, and alternative dispute resolution. Limited enrollment.

**279. International Human Rights Seminar (2)**

Seminar—2 hours. Prerequisite: prior or concurrent enrollment in course 248 or consent of instructor. Selected topics pertaining to the protection of individuals under treaties and norms of customary international law. Specifically, problems such as the extent to which national courts are required to uphold such rights; how the U.N. can create human rights law; remedies and international enforcement mechanisms; the use of force for human rights purposes, and the substantive requirements of specific human rights norms such as those concerning war crimes, genocide, apartheid, terrorism and torture. Required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

**280. Advanced Legal Writing Seminar (2)**

Seminar—2 hours. How to write a variety of legal documents in plain English. Writing exercises and outside readings will be assigned weekly. Each student completes an individual writing project in lieu of final examination. The writing project will satisfy the law school's advanced legal writing requirements. Limited enrollment. (S/U grading only.)

**281. Local Government Law (2)**

Discussion—2 hours. Comprehensive course with some emphasis on California municipalities. Topics include organization, reorganization, and operation (including open meetings); intergovernmental relationships (federal, state, and local, with emphasis on state and local); legislation (authority—including police power and citizen-initiated laws—and enforcement); finance; land use and environmental quality; redevelopment; eminent domain; and regional issues.

**282. Energy Law Seminar (2)**

Seminar—2 hours. Focus on the regulation of energy distributing industries, such as electricity and natural gas. Topics include energy economics, cost/benefit analysis, rate-making methodologies, alternative energy technologies, conservation, and administrative regulation of the energy sector.

**283. Remedies (3)**

Discussion—3 hours. Survey of modern American civil remedies law, in both private and public law contexts. Topics include money damages, injunctive relief, restitution, contempt power, attorneys fees; and equitable defenses such as estoppel and laches. Additional attention to special obstacles to remedies against governmental officials and institutions, such as sovereign immunity, official immunity, and abstention.

**284. Law and Economics (3)**

Discussion—3 hours. Prerequisite: no prior knowledge of economics is required; students with strong background in economics may not enroll. Study of the ways in which economics helps to explain or to influence the law.

**285. Environmental Law (3)**

Discussion—3 hours. Introduction to federal environmental law, including an overview of its historical development: the role of courts, the legislature, and executive agencies; allocation of authority among different levels of government; the role of market forces in environmental decisions; and the major regulatory strategies for controlling environmental harm.

**286A. Health Law (3)**

Discussion—3 hours. Course will identify and analyze the myriad legal issues which arise in the dynamic health care industry of the 1990s. Specific focus on the legal implications posed by various business arrangements between providers and payors, from social issues such as AIDS, human reproduction, and the right to die, to external forces, such as government regulation, and the competitive market place. Explores many substantive issues, and



addresses legal issues posed by the various options presented under the label of "health care reform" and the emerging "integrated delivery systems" of the health care industry.

#### **286B. Advanced Health Law Seminar(2)**

Seminar—2 hours. Legal and business aspects of the delivery of health care through a sophisticated integrated system operating in a mature managed care environment. In-depth study and application of the many laws which apply to integrated delivery systems, physician networks, PSOs and other entities through which health care is provided. Specific laws addressed include the Fraud and Abuse laws, the False Claims Act, Medicare Anti-Kickback Statute, Ethics in Patient Referral Laws ("Stuart I and II") and the Health Insurance Portability and Accountability Act, the Balanced Budget Act and other laws applicable to health care regulation, fraud, and abuse in particular. Each of these issues analyzed against the backdrop of a mature integrated delivery system (e.g. Sutter Health, Mercy Healthcare Sacramento) operating in a highly penetrated managed care market.

#### **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).

#### **288. Advanced Constitutional Law Seminar (2)**

Seminar—2 hours; paper. Explores in-depth selected topics or problems in constitutional law and theory. Initial topics may include the regulation of hate speech, the interpretation of the Establishment Clause, or the development of the Takings Clause doctrine. Other topics selected by the seminar group. Students will write papers and present them to the seminar. Satisfies advanced legal writing requirement. Limited enrollment.

#### **289. Pollution Control and Remediation (3)**

Discussion—3 hours. Introduction to the law regulating use and disposal of toxic substances, air and water pollution, and remediation of environmental releases of hazardous materials. Topics include the choice of regulatory policy, the role of risk assessment, and the role of cost-benefit analysis. Emphasis on federal statutes, including the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and Comprehensive Environmental Response Compensation and Liability Act, but common law tort remedies are also considered.

#### **290. International Trade Dispute Seminar (2)**

Seminar—2 hours. One of the great debates raging in international trade circles is between pragmatists and legalists. Pragmatists argue that informal, negotiation-based dispute resolution processes are the best, and perhaps the only workable, means of effectively settling trade controversies between disputing countries. Legalists believe that formal, litigation-style dispute resolution processes are superior and that "soft" pragmatic approaches to settling trade disputes inherently are doomed to failure. Introduction to the economic, political, and legal theories underlying the debate and, using actual disputes from NAFTA, MERCOSUR, and the WTO, attempts to determine which camp has the better argument. Grade based on paper and class presentation. Satisfies the advanced legal writing requirement. Limited enrollment.

#### **291. International Trade Law and Latin America (3)**

Discussion—3 hours. Covers the role of the executive, legislative and judicial branches of the United States with respect to international trade policy. International topics include the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade Agreements (GATT, 1947), the GATT, 1994, North American Free Trade Agreement (NAFTA) and economic integration in this Western Hemisphere. Students are encouraged to do supervised research on selected topics of trade law and Latin America. Satisfies the advanced legal writing requirement.

#### **292. Immigration Law and Procedure (3)**

Discussion—3 hours. Survey of a brief history of U.S. immigration and policy; federal agency interrelationship (Justice and State Department); entry of nonimmigrant (temporary) visitors and immigrants into the United States; the worldwide quota and preference systems; family and employment relationship critical to securing favored immigrant status; deportation procedures; discretionary relief available to persons otherwise subject to deportation; available defenses to deportation and exclusion proceedings; immigration consequences of criminal conviction; refugee and asylum law; administrative appeals; federal and state judicial relief; citizenship and naturalization.

#### **293. Public Interest Law Seminar (2)**

Seminar—2 hours. Examines the problems associated with providing legal services to those people and interests in American society traditionally unable to afford those services. The class will discuss selected readings that review various theoretical issues and specific problems facing public interest lawyers. May satisfy advanced legal writing requirement. Limited enrollment.

#### **294. Environmental Law Seminar (2)**

Seminar—2 hours. Open to law and ecology graduate students. Wildlife law and policy, covering domestic and international law. Topics may include fishing and hunting regulations; responses to exotic species; protection of biodiversity; the role of international law and trade restrictions; division of authority between federal, state and local governments; Indian treaty rights. Students lead a class discussion and write a research paper, which may satisfy the writing requirement. Limited enrollment.

#### **295. Business Bankruptcy (2)**

Discussion—2 hours. Prerequisite: course 243, or good business law background and consent of instructor. Techniques for solving problems of a business having trouble paying its debts. Matters of business planning and deal-structuring, mostly under the Bankruptcy Code.

#### **296. Copyright (3)**

Discussion—3 hours. Detailed look at the law of Copyright, with emphasis on its application to literary, musical and artistic works, and to motion pictures, television, and theater. Some related issues, including the protection of titles and characters, and the right of publicity.

#### **297. Dispute Resolution and Lawyers (2)**

Discussion—2 hours. Not open to students previously or concurrently enrolled in courses 239 (Mediation) or 278 (Pretrial Skills). Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. Exercises include interviewing, counseling, negotiations, arbitration and mediation. Limited enrollment.

### **Additional Professional Courses**

#### **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.)

#### **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 (Moot Court) (1)**

Program includes classroom instruction in appellate procedure and appellate advocacy skills and participation in the moot court program. Participants in 410A work on three oral advocacy problems and argue six times before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

#### **410B. Appellate Advocacy (Moot Court) (1)**

Prerequisite: course 410A. Continuation of course 410A. Participants in 410B research and write an appellate brief and argue the case twice before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

#### **411. Journal of International Law and Policy (1)**

The Editor-in-Chief of the Journal receives one credit for each semester of service. Only one person may receive this credit in any one semester. (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 moot 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 (1-2)**

Writing of an editorship quality law review article under the editorial supervision of editors of the *Law Review*. Minimum of 40 hours contribution to the *Review's* publication is also required. Credit may be obtained only upon achieving status as a member of the *Law Review*, which requires that the student have made substantial progress toward completing an editorship article. Credit is awarded only after certification by the Editor-in-Chief of the *Law Review* and approval of the faculty advisers to the *Law Review*. One unit of credit is earned the first semester. Two units are earned the second semester upon completing an editorship draft. One unit is earned second semester if only a membership draft is completed. (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. Environs Editor (1)**

The Editor-In-Chief of *Environs* receives one credit for each semester of service. Only one person may receive this credit in any one semester. (S/U grading only.)

**419. Advanced Writing Project (1-4)**

Completion of a writing project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. Writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten, double-spaced pages, excluding footnotes. 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). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (Grading may be on S/U or letter-grade basis at the faculty supervisor's discretion.)

**420. Civil Rights Clinical Program (2-6)**

Clinical program. Prerequisite: prior or concurrent enrollment in course 267 and 219. Provides practical experience in providing legal services to indigent clients who have filed civil rights actions in the United States District Court for the Eastern District of California. Students will work on clinic cases under the supervision of the clinic director and supervising attorney. Limited enrollment. (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.)

**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 Clinical (2-4)**

Clinical program. Prerequisite: prior or concurrent enrollment in course 231 or 210, or consent of instructor. Provides students with 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 contrasted with their interpretation and enforcement. Journals are required. (S/U grading only.)

**450. Environmental Law Clinical (2-4)**

Clinical program. Practical experience in environmental law. Students will work under the direct supervision of a government or private lawyer engaged in some form of environmental law work for a minimum of 8 office hours per week. Students will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience. (S/U grading only.)

**455. Employment Relations (2 to 6)**

Clinical program. Prerequisite: prior or concurrent enrollment in course 251 or 260. Practical experience in employment relations: private and public sector labor law, or employment discrimination. Students

work under the direct supervision of a government or private lawyer and have the opportunity to participate in a range of activities associated with their specific office, with emphasis on observation and participation in actual investigation, interviewing, drafting of pleadings, and attendance at hearings. Journals and attendance at one or more small group meetings are required. Clinical students must complete an evaluative final paper of approximately 8 pages. (S/U grading only.)

**460. Public Interest Law Clinical (2-6)**

Clinical program. 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. Clinical Program in Administrative Law (2-6)**

Clinical program. Prerequisite: course 235 (may be taken concurrently) or consent of instructor. For students interested in a work experience in an administrative law setting. Students will work under the direct supervision of an administrative law judge, hearing officer, or government attorney. Placement assistance will be provided by the instructor. A goal of this clinical will be a breadth of experience in the areas of formal adjudication, informal adjudication, rulemaking, and judicial review. Students will be required to meet monthly as a group to share experiences and maintain observational journals. (S/U grading only.)

**470. Administration of Criminal Justice (2 to 6 or 12)**

Clinical program. Prerequisite: courses 219, 227 (may be taken concurrently); course 263 recommended (may be taken concurrently). This program affords students the opportunity to 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 enrolled in the program engage in the full range of activities associated with their specific office with emphasis on observation and participation in factual investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Note: students wishing to practice must qualify for a certification by the relevant state or federal jurisdiction. Journals and seminar attendance are required. Limited enrollment. (S/U grading only.)

**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 case load. 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. Instruction in Legal Research and Legal Writing Skills (1-2)**

Participants will assist in instructing legal research and writing for first-year students under the direction of the legal research and writing instructors. Approval of the research and writing instructors is required for enrollment. Participants may assist once in the legal research program and once in the legal writing program. One unit will be given in the fall semester for legal research instruction and two units in the spring for legal writing instruction. (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. Research in Legal Problems (1-4)**

Students may receive credit for individual research 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 in advance of the semester in which it is to be undertaken; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.) In exceptional cases, with prior approval of a professor and an associate dean, students may arrange for directed research in foreign and/or international legal problems by working abroad under the supervision of a UC Davis Law School faculty member and an attorney or faculty member at a foreign or international government agency or educational institution (4 up to 12 units). S/U grading only unless letter grading requested in advance.

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## Linguistics

(College of Letters and Science)

Steven G. Lapointe, Program Director

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World Wide Web: <http://linguistics.ucdavis.edu>

**Committee in Charge**

Wilbur A. Benware, Ph.D. (*Linguistics*)

Patrick Farrell, Ph.D. (*Linguistics*)

Steven G. Lapointe, Ph.D. (*Linguistics*)

Martha Macri, Ph.D. (*Anthropology, Native American Studies*)

Maria I. Manoliu, Ph.D. (*French*)

Almerindo E. Ojeda, Ph.D. (*Linguistics*)

Mary Schleppegrell, Ph.D. (*Linguistics*)

Lenora A. Timm, Ph.D. (*Linguistics*)

Máximo Torreblanca, Ph.D. (*Linguistics*)

**Faculty**

Wilbur A. Benware, Ph.D., Professor

Robert Blake, Ph.D., Professor (*Spanish*)

Cecilia Colombi, Ph.D., Associate Professor (*Spanish*)

Patrick Farrell, Ph.D., Associate Professor

Fred H. Genesee, Ph.D., Professor (*Education*)

Jeffrey King, Ph.D., Associate Professor (*Philosophy*)

Steven G. Lapointe, Ph.D., Associate Professor

Debra L. Long, Ph.D., Associate Professor (*Psychology*)

Martha Macri, Ph.D., Associate Professor

(*Anthropology, Native American Studies*)

Maria I. Manoliu, Ph.D., Professor (*French*)

Barbara J. Merino, Ph.D., Professor (*Education*)

Almerindo E. Ojeda, Ph.D., Associate Professor

Winfried Schleiner, Ph.D., Professor (*English*)

Mary Schleppegrell, Ph.D., Assistant Professor

Janet S. Smith, Ph.D., Professor (*Anthropology*)

Lenora A. Timm, Ph.D., Professor

Máximo Torreblanca, Ph.D., Professor  
 Carolyn F. Wall, Ph.D., Lecturer (*Anthropology*)  
 Karen A. Watson-Gegeo, Ph.D., Professor  
 (*Education*)  
 Aram Yengoyan, Ph.D., Professor (*Anthropology*)

### Emeriti Faculty

David L. Olmsted, Ph.D., Professor Emeritus  
 Benjamin E. Wallacker, Ph.D., Professor Emeritus  
 Gwendolyn Schwabe, M.A., Senior Lecturer Emerita

### Affiliated Faculty

Nina F. Dronkers, Ph.D., Associate Adjunct Professor  
 Janet Lane, Lecturer  
 Ellen Lange, M.A., Lecturer  
 Mary Lowry, 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: for example, in the computer science industry; in teaching English as a second language; in foreign language teaching; in elementary and secondary level bilingual-bicultural programs; in missionary work; in bilingual-bicultural curriculum development (for example, in publishing houses); in legal work; in speech therapy; or as lexicographers (for dictionaries). All these types of employment share an interest in persons skilled in the analysis of language, spoken and/or written—linguistics equips its students with just such skills.

## A.B. Major Requirements:

|                                                                                                                                                                                                                                                                                                             | UNITS        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                     | <b>4-24</b>  |
| 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         |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                           | <b>44</b>    |
| Linguistics 103A, 103B, 111, 112, 121, 131, 141, 151, 152 .....                                                                                                                                                                                                                                             | 36           |
| At least eight upper division units from the following courses .....                                                                                                                                                                                                                                        | 8            |
| Any other Linguistics course not included in the 36-unit requirement above, Anthropology 112, 113, 117, 119, 120, Education 151, English 105B, French 160, 161, German 105, 106, 107, 108, Human Development 101, Philosophy 137, Psychology 132, Rhetoric 105, Russian 160, Spanish 111N, 112N, 113, 114N. |              |
| <i>The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.</i>                                       |              |
| <b>Total Units for the Major</b> .....                                                                                                                                                                                                                                                                      | <b>48-68</b> |

**Major Adviser.** W. Benware.

## Minor Program Requirements:

The minor in Linguistics provides the student with a basic knowledge of linguistic analysis. It is appropriate for students interested in any aspect of language use.

|                                                                                                      | UNITS     |
|------------------------------------------------------------------------------------------------------|-----------|
| <b>Linguistics</b> .....                                                                             | <b>24</b> |
| Linguistics 1, 103A, 103B .....                                                                      | 12        |
| One course from Linguistics 111, 112, 121, 131, 141, 151, 152 .....                                  | 4         |
| Additional units of upper division Linguistics courses, chosen in consultation with an adviser ..... | 8         |

**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 refer to the Academic Information section of this catalog.

**Graduate Study.** The Linguistics Graduate Group offers study and research leading to the M.A. degree. Detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.

**Graduate Adviser.** A.E. Ojeda.

## Courses in Linguistics (LIN)

### Lower Division Courses

**1. Introduction to Linguistics** (4) I, II, III. Farrell, Benware, Ojeda  
 Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. GE credit: ArtHum or SocSci, Wrt.

**\*4. Linguistics for Students of Literature** (4) III. Manoliu  
 Lecture—3 hours; term paper. Prerequisite: course 1 recommended. Introduction to basic linguistic concepts and models needed for the interpretation of literary texts. Topics include meaning in texts, lexical meaning, linguistic variation in texts, sound systems and poetry.

**20. Oral English for Undergraduate ESL Students** (3) III. The Staff (Lowry in charge)  
 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. (P/NP grading only.)

**21. Introduction to Reading and Composition for Non-Native Speakers** (5) I. The Staff (Lowry in charge)  
 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. (Former course English 21.) (P/NP grading only.)

**22. Intermediate Reading and Composition for Non-Native Speakers** (4) I, III, III. The Staff (Lowry in charge)  
 Lecture/discussion—4 hours. Prerequisite: admission by placement examination or by successful completion of course 21. 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. (Former course English 22.) (P/NP grading only.)

## 23. Advanced Reading and Composition for Non-Native Speakers

(4) I, II, III. The Staff

(Lowry in charge)

Lecture/discussion—4 hours. Prerequisite: admission by placement examination or by successful completion of course 22. 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. (Former course English 23.) (P/NP grading only.)

## 25. English for International Graduate Students I

(5) I. The Staff (Lane in charge)

Lecture—3 hours; laboratory—6 hours. Prerequisite: admission by placement examination; admission limited to international graduate students and limited status (international) undergraduate students. Develops skills needed for studying on the graduate level: note-taking on lectures and on written academic material, writing logically and accurately under time pressure, giving oral presentations, systematically extending vocabulary, and writing a research paper. May be repeated for credit with consent of coordinator. (Former course English 25.) (P/NP grading only.)

## 26. Writing for International Graduate Students

(3) II. The Staff (Lane in charge)

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.)

## 50. Languages of the World

(4) III. Benware

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 1 or Anthropology 4 recommended. Survey of the world's languages, their classification, distribution, and interrelationships; structural similarities and differences; accounts of the origin of human language; sign languages, pidgin/creoles, "universal" languages, endangered languages, and languages of global significance. GE credit: ArtHum or SocSci, Wrt.

## 96. Directed Group Study in English as a Second Language

(1-5) I, II, III. The Staff

(Schlepppegrell in charge)

Variable—1-5. 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.)

## 98. Directed Group Study

(1-5) I, II, III. The Staff

(Director in charge)

Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

## 99. Special Study for Undergraduates

(1-5) I, II, III. The Staff

(Director in charge)

Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

## Upper Division Courses

### 103A. Linguistic Analysis I: Phonetics, Phonology, Morphology

(4) I, II. The Staff

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.

### 103B. Linguistic Analysis II: Morphology, Syntax, Semantics

(4) I. Lapointe; II. Farrell

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.



**104. English Grammar (4) I.** The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of present-day English grammar from the perspective of contemporary linguistics. Focus on major syntactic and morphological constructions, their uses, and variation across dialects, styles, and registers. Not open for credit to students who have completed English 105A.

**\*105. Topics in Language and Linguistics**

(4) III. The Staff  
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 in alternate years.

**111. Introduction to Phonological Theory (4) II.** The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to contemporary phonological theory, with emphasis on autosegmental, metrical, and lexical theory. Not open for credit to students who have completed course 164.

**112. Phonetics (4) III.** The Staff  
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. Detailed examination of articulatory and acoustic phonetics. Not open for credit to students who have completed course 109.

**121. Morphology (4) III.** Lapointe  
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. Not open for credit to students who have completed course 142.

**131. Introduction to Syntactic Theory (4) II.** Lapointe  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 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. Not open for credit to students who have completed course 165.

**141. Semantics (4) II.** Ojeda  
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. Introduction to the linguistic study of the meanings of words and phrases. Survey of the meanings expressed by lexical items and derivational and inflectional morphology, as well as the contribution of argument structure, quantification, and coordination to meaning. Not open for credit to students who have completed course 120. GE credit: Wrt.

**151. Historical Linguistics (4) I.** Benware  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. Not open for credit to students who have completed course 102.

**152. Language Universals and Typology (4) II.** Farrell  
Lecture—3 hours; term paper. Prerequisite: courses 103A, 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. Not open for credit to students who have completed course 170. GE credit: Wrt.

**163. Language, Gender, and Society (4) I.** Timm  
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. Not open for credit to students who have completed course 113. GE credit: SocSci, Div, Wrt.

**166. The Spanish Language in the United States (4) III.** Torreblanca  
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. Not open for credit to students who have completed course 116. GE credit: Div, Wrt.

**\*167. Chicano Sociolinguistics (4) I.** Timm  
Lecture—3 hours; term paper. Prerequisite: course 1; Spanish 3 or the equivalent. Topics covered include the linguistic features of Chicano Spanish, Spanish-English code-switching, regional and social diversity in Chicano Spanish, Chicano English, acquisition of bilingualism, language choice and use, attitudes about Spanish and English, Spanish language maintenance, Chicano bilingualism and education. Not open for credit to students who have completed course 115. GE credit: Div, Wrt.

**\*171. Introduction to Psycholinguistics (4) II.** Lapointe  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; courses 103A, 103B recommended. Introduction to psycholinguistic 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. Not open for credit to students who have completed course 135. Offered in alternate years. GE credit: SocSci.

**173. Language Development (4) III.** Ward  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor; courses 103A, 103B recommended. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. Not open for credit to students who have completed course 138. GE credit: SocSci.

**175. Biological Basis of Language (4) III.** Dronkers  
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.

**192. Internship in Linguistics (1-12) I, II, III.** The Staff (Timm in charge)  
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) I, II, III.** The Staff (Director in charge)  
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) I, II, III.** The Staff (Chairperson in charge)  
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) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (P/NP grading only.)

**Graduate Courses**

**\*203A. Modern Linguistic Theory: Structuralism (4) II.** Manoliu  
Lecture—3 hours; term paper. Prerequisite: courses 103A, 103B. History of thought in grammatical theory from de Saussure to 1950 with emphasis on critical examination of major theoretical problems in the field. Not open for credit to students who have completed course 225A. Offered alternate years.

**203B. Modern Linguistic Theory: Generative Grammar (4) I.** Farrell  
Lecture—3 hours; term paper. Prerequisite: courses 111, 131. History of thought in grammatical theory from 1950 to the present with emphasis on critical examination of major theoretical problems in the field. Not open for credit to students who have completed course 225B. Offered in alternate years.

**205A-205B-205C-205D. Topics in Linguistic Theory and Methods (4) I.** Schleppegrell; II. Manoliu  
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) III.** The Staff  
Lecture—3 hours; term paper. Prerequisite: course 111. Critical examination of current phonological theories. Not open for credit to students who have completed course 239. Offered in alternate years.

**\*212. Advanced Phonetics (4) III.** The Staff  
Lecture—3 hours; term paper. Prerequisite: course 112. Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Not open for credit to students who have completed course 209. Offered in alternate years.

**231. Advanced Syntactic Theory and Analysis (4) III.** Farrell  
Lecture—3 hours; term paper. Prerequisite: course 131. Critical survey of contemporary theories of syntax. Not open for credit to students who have completed course 265. Offered in alternate years.

**\*241. Advanced Semantic Theory and Analysis (4) II.** Ojeda  
Lecture—3 hours; term paper. Prerequisite: course 141 or consent of instructor. Advanced critical exploration of contemporary theories of linguistic semantics. Not open for credit to students who have completed course 210. Offered in alternate years.

**251. Principles of Historical Linguistics (4) II.** Benware  
Lecture—3 hours; term paper. Prerequisite: course 151. Advanced analysis of the theory and methods of historical linguistics. Not open for credit to students who have completed course 202. Offered in alternate years.

**252. Romance Linguistics (4) III.** Manoliu  
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. Not open for credit to student who have completed course 220. Offered in alternate years.

**280. Theories of Second Language Acquisition (4) I.** The Staff  
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.

**281. Research on Second Language****Acquisition** (4) II. The Staff

Lecture—2 hours; laboratory—1 hour; term paper; computer projects. Prerequisite: upper division or graduate standing. Analysis of theory/research on L2 acquisition. Topics include: contrast of L1/L2 acquisition; current theories of L2 such as the natural order and input hypotheses, as well as effects of individual variation, cognition, motivation on L2; research design and basic statistical analyses.

**282. Individual and Social Aspects of Bilingualism** (4) III. The Staff

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.

**297T. English as a Second Language****Teaching/Tutoring** (1-4) I, II, III. The Staff

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) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: graduate standing. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff

(S/U grading only.)

**Professional Courses****300. The Teaching of English as a Foreign Language** (4) I. Schleppegrell

Lecture—3 hours; laboratory—3 hours. Prerequisite: English 105A or course 109 or consent of instructor. Methods of teaching English to nonnative speakers, stressing particularly recent linguistic methodology and techniques.

**301. Materials of TESOL** (4) II. The Staff

Lecture—4 hours. Prerequisite: course 300 or consent of instructor. Designing and evaluating ESL curricula and proficiency assessment instruments in all areas of language acquisition (pronunciation, reading, listening comprehension, etc.). Developing lessons, teaching and tutoring in selected language acquisition areas in the UCD ESL clinic. Evaluating (and adapting) published ESL materials.

**302. Recent Research and Special Projects in TESOL** (4) III. Schleppegrell

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 UCD ESL clinic. Each student also designs and reports on a classroom research project.

**391. Oral English for ESL Students** (3) II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Linguistics (A Graduate Group)

Steven G. Lapointe, Ph.D., Chairperson of the Group  
Group Office, 108 Sproul Hall (530-752-9933)

**Faculty.** The Group includes faculty from eight departments in the College of Letters and Science.

**Graduate Study.** The Graduate Group in Linguistics offers a program of study leading to the M.A. degree. There are two tracks within the program, one concentrating on applied linguistics and TESOL, and the other on general linguistics. Within the general linguistics track, the following areas are emphasized: (a) grammatical analysis and theory in syntax, morphology, semantics, and phonology, (b) sociolinguistics, (c) psycholinguistics and neurolinguistics, and (d) linguistic description (contemporary or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC Davis serves as preparation for advanced graduate work at the Ph.D. level, as a supplement to studies in related fields—especially anthropology, psychology, philosophy, the various languages—or as a major component in the training for a professional career (such as TESOL, speech therapy, and foreign language teaching). The program places considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the candidate's knowledge, and providing a wider and more flexible variety of options to pursue thereafter.

**Preparation.** Applicants to the M.A. program who do not have a bachelor's degree in Linguistics must complete certain courses in Linguistics from the undergraduate program. Applicants to the *Applied Track* must complete 103A and 103B (introduction to linguistic analysis I and II), 141 (semantics), and 151 (historical linguistics). Applicants to the *General Track* must complete all of the above four courses, plus 111 (introduction to phonological theory), 112 (phonetics), and 131 (introduction to syntactic theory).

**Requirements.** The requirements for the two tracks differ. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper division and graduate course work above and beyond the prerequisite courses listed under Preparation (above) must be completed, and a thesis is required. The track in applied linguistics and TESOL operates under either Plan I or Plan II. The Plan I requirements are the same as those listed above. Under Plan II, 36 units of upper division and graduate course work above and beyond the prerequisite courses are required, and at the end of the course work a student must pass a written comprehensive examination. Students in both tracks must pass a foreign language reading examination.

**Graduate Adviser.** A.E. Ojeda (*Linguistics*).

## Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

**Chinese**

- 10. Modern Chinese Literature (in English)
- 11. Great Books of China
- \*50. Introduction to the Literature of China and Japan
- \*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)
- \*132. Readings in Modern Chinese Poetry

**Classics**

- \*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
- \*15. The Spiritual Quest
- 20. Man and the Natural World
- \*25. Ethnic Minority Writers in World Literature
- \*53A. Literature of China and Japan
- 53B. Literature of India and Southeast Asia
- \*120. Writing Nature: 1750 to the Present
- 135. Women Writers
- 138. Gender and Interpretation
- \*140. Thematic and Structural Study of Literature
- 141. Literary Theory and Criticism
- \*142. Critical Reading and Analysis
- 144. The Grotesque
- 145. Representations of the City
- \*146. Myth in Literature
- \*152. Literature of the Americas
- \*153. The Forms of Asian Literature
- \*157. War and Peace in Literature
- \*158. The Detective Story as Literature
- 159A-G. Special Topics in Comparative 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
- 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
- 195. Senior Seminar

**Dramatic Art**

- 20. Introduction to Dramatic Art
- 156A. History of Theatre and Dance: Ancient to 1650
- 156B. History of Theatre and Dance: 1650-1900
- 156C. History of Theatre and Dance: The Twentieth Century
- 159. Contemporary Experimental Theatre and Drama

**English**

- \*171A. The Bible as Literature: The Old Testament
- \*171B. The Bible as Literature: Prophets and New Testament

**French**

- \*25. Introduction to French Literature
- \*112. Masterpieces of French Drama

- \*113. Masterpieces of French Novel  
 \*114. French Philosophical Literature

### German

47. Erasmus and Christian Humanism  
 48. Myth and Saga in the Germanic Cultures  
 49. Freshman Colloquium  
 50. Survey of German Culture  
 51. Introduction to Literary Analysis  
 110. Older German Literature  
 111A-H. Studies of Major Writers  
 112A-C. Topics in German Literature  
 113. Goethe's *Faust*  
 114. The *Faust* Tradition before and after Goethe  
 115A. German Literature since 1945  
 115B. German Literature since 1945  
 116. From Goethe's *Werther* to Today's *Werthers*  
 117A. The Tristan Tradition: Medieval, Musical, Modern  
 117B. The Nibelungen Tradition: Medieval, Musical, and Modern  
 117C. The Parzival Tradition: Medieval, Musical, and Modern  
 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  
 118E. Contemporary German Culture  
 119. From German Fiction to German Film  
 130. Modernity and its Discontents: The Tradition of German Cultural Critique  
 140. German Political Literature from the Middle Ages to the Present  
 141. The Holocaust and its Literary Representation  
 142C. New German Cinema: From Oberhausen to the Present

### Italian

- \*139B. Boccaccio, Petrarch and the Renaissance  
 \*140. Italian Literature in English Translation: Dante, *Divine Comedy*

### 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

### 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)  
 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  
 \*121. Nineteenth-Century Russian Prose  
 \*123. Twentieth-Century Russian Prose  
 126. The Russian Theater  
 \*130. Contemporary Soviet Culture

- \*131. Literature of Revolution  
 \*132. Nature and Culture in the Soviet Union  
 \*140. Dostoevsky  
 141. Tolstoy  
 150. Russian Culture  
 151. Soviet Writers and Censorship  
 \*154. Russian Folklore  
 \*166. Representations of Sexuality in Russian Literature

### Spanish

149. Latin-American Literature in Translation

## Management, Graduate School of

Robert H. Smiley, Ph.D., Dean  
 Michael W. Maher, Ph.D., Associate Dean  
 Donald Blodger, M.A., Assistant Dean  
 School Office, 106 AOB IV (530-752-7399)

### Faculty

Brad M. Barber, Ph.D., Associate Professor  
 Nicole W. Biggart, Ph.D., Professor (*Management, Sociology*)  
 George Bittlingmayer, Ph.D., Professor  
 Eyal Biyalgorsky, Ph.D., Assistant Professor  
 David S. Bunch, Ph.D., Associate Professor  
 Richard P. Castanias, II, Ph.D., Associate Professor  
 Peter K. Clark, Ph.D., Professor  
 Masako Darrough, Ph.D., Associate Professor  
 Kimberly D. Elsbach, Ph.D., Assistant Professor  
 Eitan Gerstner, Ph.D., Professor  
 Paul A. Griffin, Ph.D., Professor  
 Michael R. Hagerty, Ph.D., Associate Professor  
 John Lyon, Ph.D., Associate Professor  
 Prasad Naik, Ph.D., Assistant Professor  
 Terrance Odean, Ph.D., Assistant Professor  
 Donald A. Palmer, Ph.D., Professor  
 Srinivasan P. Rangan, Ph.D., Assistant Professor  
 David M. Locke, Ph.D., Professor  
 Donald M. Topkis, Ph.D., Professor  
 Chih-Ling Tsai, Ph.D., Professor  
 Gary M. Walton, Ph.D., Professor (*Management, Economics*)  
 David Woodruff, Ph.D., Assistant Professor

### Emeriti Faculty

Richard C. Dorf, Ph.D., Professor Emeritus  
 Jerome J. Suran, B.S., Ph.D. (hon.), Senior Lecturer Emeritus

## Courses in Management (MGT, MGP)

### Lower Division Courses

**11A. Elementary Accounting (4) I, II.** The Staff  
 Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles.

**11B. Elementary Accounting (4) III.** The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation.

### Upper Division Course

**100. Introduction to Financial Accounting (3)**  
 The Staff  
 Lecture—3 hours. Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction 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.

## Graduate Courses

(Core Courses)

**200A. Financial Accounting (3) I.** Lyon  
 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.

**200B. Managerial Accounting (3) III.** Darrough  
 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.

**201A. The Individual and Group Dynamics (3) I.** Palmer  
 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.

### 201B. Organizational Structure and Strategy

(3) II. Biggart  
 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 cycles and change.

**202A. Markets and the Firm (3) I.** Bittlingmayer  
 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.

### 202B. Business, Government, and the International Economy (3) II.

Clark  
 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.

**203A. Data Analysis for Managers (3) I.** Tsai  
 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.

### 203B. Forecasting and Managerial Research Methods (3) II.

Rocke, Tsai  
 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.

**204. Marketing Management (3) III.** Hagerty  
 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.



**205. Financial Theory and Policy** (3) III. Barber  
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers financial 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.

**206. Decision Making and Management Science** (3) II. Bunch

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.

**207. Management Information Systems** (3) II. Topkis, Woodruff

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.

(Second-Year 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) The Staff

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.

**216. Managing Professionals, Budgets, Controls and Ethics** (3) I. The Staff

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.

**220. Public Budgeting and Finance** (3) The Staff  
Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economics and politics of taxation and resource allocation; inter-governmental financial relations; budgeting activities of local governments.

**223. Power and Influence in Management** (3) Palmer

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 (including information), social psychological processes (including commitment), the construction of meaning, and ethics.

**\*224. Human Resources Management** (3) Biggart

Lecture—3 hours. Problems of recruiting, training, motivating, compensating, and separating workers in contemporary organizations. Topics include design of incentive systems, career management, professionalization, alienation, worker burnout, organizational deviance, and current issues such as affirmative action and the unionization of public employees.

**\*225. Labor Relations** (3) The Staff

Lecture—3 hours. Course deals with labor organization, employment relationships, employer-employee negotiations, contracts, and litigation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

**227. Managing a Diverse Workforce** (3) I. Biggart

Lecture—3 hours. Prerequisite: graduate student. Reviews recent demographic changes such as increased ethnic diversity and an aging population in the regional and national labor force. The impact of these changes on hiring practices, internal labor markets, compensation and benefits issues, and non-traditional work arrangements.

**228. Statistical Quality Control and Productivity Improvement** (3) Rocke

Lecture—3 hours. Prerequisite: Statistics 106. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability, and graphical tools. (Same course as Statistics 228.)

**229. Global Strategy** (3) Biggart

Lecture—3 hours. Examines recent restructurings in the world economy including the European Economic community, East Asian economies of Japan, Taiwan, and South Korea, and changes in Eastern Europe.

**\*232. Urban Policy and Planning** (3) The Staff

Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

**\*233. Regulation and Policy in Agriculture** (3) The Staff

Lecture—3 hours. Implications for management of regulation and public policy on agricultural production choices, practices, processing, and marketing; influences on management strategy, organization, business practices, and resource productivity; trends in regulation and policy and their potential for management strategies are explored.

**240. Management Policy and Strategy** (3) I. Suran, Hagerly

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.

**241. Managerial Decision Making** (3) Bunch

Lecture—3 hours. Develops analytical skills for evaluating decisions and solving problems in various managerial settings. Emphasis is on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

**244. New and Small Business Ventures** (3) Dorf

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.

**245. International Marketing** (3) II. Hagerly

Lecture—3 hours. Prerequisite: graduate student and course 204. Teaches marketing strategy and tactics applied across national borders. Includes lectures and cases on import/export, joint ventures, off-shore subsidiaries, management contracts, transfer pricing, and currency exchange. Gives methods of market research and competitor intelligence in diverse cultures.

**247. Customer Service as a Marketing Tool** (3) I. Gerstner

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.

**246. Negotiation and Team Building** (3) III. Hagerly

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.

**248. Marketing Strategies** (3) Gerstner

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.

**249. Marketing Research** (3) Hagerly

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.

**250. Technology Management** (3) Suran

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.

**251. Management of Innovation** (3) Dorf

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.

**252. Production and Operations Management** (3) Woodruff

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, queueing, and network models.

**260. Financial Management** (3) Castanias

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.

**261. Investment Analysis** (3) Barber

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.

**262. Money and Security Markets** (3) Bittlingmayer

Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets.

**263. Options and Futures Markets** (3) Clark

Lecture—3 hours. Studies the behavior of options, futures, and other derivatives securities markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, swaps, and financial futures contracts. Price determination in options and futures markets is also examined.

**264. Business Taxation** (3) Blumenfeld

Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance deci-

sions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

**265. Theory of Financial Decision Making (3)**  
Castanias

Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

**266. International Finance (3)** Castanias  
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

**268. Management Communications (3)**  
Kennedy

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.

**270. Corporate Financial Reporting (3)** Griffin  
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.

**271. Accounting and Budgeting for Management Control (3)** Maher  
Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

**272. Evaluation of Financial Information (3)** Griffin  
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.

**273. Accounting and Reporting for Government Nonprofit Entities (3)** Maher  
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.

**274. Auditing, Internal Control, and Public Accounting (3)** Lyon  
Lecture—3 hours. Concentrates on role of the independent public accountant as auditor and consultant, from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

**276. Real Estate, Finance and Development (3)** Il. The Staff  
Lecture—3 hours. Prerequisite: course 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.

**\*280. Data and File Management (3)** Topkis  
Lecture—3 hours. Concepts of information storage and retrieval on digital computers. Emphasis on file structures and their uses within organizations; applications drawn from both the public and private sector.

**281. Systems Analysis and Design (3)** Woodruff  
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.

**\*283. Optimization Theory and Applications (3)** Topkis  
Lecture—3 hours. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; transportation, networks, and large-scale systems; and

computer implementation. Applications are made to problems in private and public management.

**284. Applied Linear Models for Management (3)** Tsai  
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems.

**285. Time Series Analysis and Forecasting (3)** Tsai  
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.

**286. Telecommunications and Computer Networks (3)** Topkis  
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.

**287. Database Systems (3)** Topkis  
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.

**\*288. Special Topics in Management of Information Systems (3)** Topkis  
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.

**290. Seminar in Management (3)**  
Seminar—3 hours. Interdisciplinary case study of a real business or government enterprise.

**298. Directed Group Study (1-5)** The Staff  
Prerequisite: consent of instructor.

**299. Individual Study (1-12)** The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

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## Master of Education (M.Ed.) (A Graduate Group)

James Grieshop, Ph.D., Chairperson of the Group  
Group Office, 1303 Hart Hall (530-752-1926)

**Faculty.** This interdisciplinary graduate group consists of faculty from departments such as Biological and Agricultural Engineering, Human and Community Development, Communication, Consumer Science, Division of Education, Environmental Design, Environmental Horticulture, Epidemiology and Preventive Medicine, Native American Studies, Nutrition, Plant Biology, Psychology, Textiles and Clothing, and Vegetable Crops.

**Graduate Study.** The Master of Education Graduate Group is housed in the Department of Human and Community Development. Master of Education (M.Ed.) degree students are preparing for leadership and professional roles in community and development education related to planning, organizational change, and evaluation. Areas of study include health education planning; community services planning and program management; community and non-formal education; international development education; program design and evaluation; organizational decisionmaking; leadership development, communication and change; extension education; environmental education; agricultural development education; and consumer behavior.

\*Course not offered this academic year.

**Requirements.** The M.Ed. degree requires 36 units minimum of upper division and graduate courses. A minimum of 18 of these units must be graduate level courses; and at least eight units must be related to research methods and/or statistics. Students submit a required Program of Study Plan in the area of intended specialization by the end of the first quarter of graduate study. A research-based field project and comprehensive oral examination are required for completion of this degree.

**Graduate Adviser.** Contact Group office.

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## Mathematical and Physical Sciences

(College of Letters and Science)  
Barry M. Klein, Program Director  
Program Office, 1201 Social Sciences and  
Humanities Building

### Committee in Charge

David R. Britt, Ph.D. (*Chemistry*)  
Charles S. Fadley, Ph.D. (*Physics*)  
Wesley O. Johnson, Ph.D. (*Statistics*)  
Louise H. Kellogg, Ph.D. (*Geology*)  
Barry M. Klein, Ph.D. (*Physics*)  
Claude F. Meares, Ph.D. (*Chemistry*)  
Jeffrey F. Mount, Ph.D. (*Geology*)  
George G. Roussas, Ph.D. (*Statistics*)  
J. Blake Temple, Ph.D. (*Mathematics*)  
Craig A. Tracy, Ph.D. (*Mathematics*)

### 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.

## Courses in Mathematical and Physical Sciences (MPS)

### Lower Division Course

**11A-11B. Mathematical and Physical Sciences Seminar (2-2)** I-II. The Staff  
Lecture—2 hours. Prerequisite: open to Minority Undergraduate Research Participation in the mathematical and physical sciences (MURPPS) students only. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members.

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## Mathematics

(College of Letters and Science)  
Craig A. Tracy, Ph.D., Chairperson of the Department  
John K. Hunter, Ph.D., Vice Chairperson of the  
Department (Graduate Matters)  
Abigail Thompson, Ph.D., Vice Chairperson of the  
Department (Undergraduate Matters)  
Department Office, 565 Kerr Hall (530-752-0827)

### Faculty

David W. Barnette, Ph.D., Professor  
Carlos R. Borges, Ph.D., Professor  
Robert J. Buck, Ph.D., Associate Professor  
Angela Y. Cheer, Ph.D., Professor  
James R. Diederich, Ph.D., Professor  
Allan L. Edelson, Ph.D., Professor

C. Albert Fannjiang, Ph.D., Assistant Professor  
 Dmitri B. Fuchs, Ph.D., Professor  
 Janko Gravner, Ph.D., Assistant Professor  
 Joel Hass, Ph.D., Professor  
 John K. Hunter, Ph.D., Professor  
 Arthur J. Krener, Ph.D., Professor  
 Gregory J. Kuperberg, Ph.D., Assistant Professor  
 E. O. Milton, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Alexander I. Mogilner, Assistant Professor  
 Motohico Mulase, Ph.D., Professor  
 Bruno L. Nachtergaele, Ph.D., Associate Professor  
 E. Gerry Puckett, Ph.D., Associate Professor  
 Jeremy D. Quastel, Ph.D., Associate Professor  
 Naoki Saito, Ph.D., Associate Professor  
 G. Thomas Sallee, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Albert Schwarz, Ph.D., Professor  
 Evelyn M. Silvia, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 David M. Stuart, Ph.D., Associate Professor  
 J. Blake Temple, Ph.D., Professor  
 Abigail Thompson, Ph.D., Associate Professor  
 William P. Thurston, Ph.D., Professor  
 Craig A. Tracy, Ph.D., Professor  
 Roger J-B. Wets, Ph.D., Professor

**Emeriti Faculty**

Henry L. Alder, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Dallas O. Banks, Ph.D., Professor Emeritus  
 Donald C. Benson, Ph.D., Professor Emeritus  
 Gulbank D. Chakerian, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Doyle O. Cutler, 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  
 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  
 Sherman K. Stein, Litt.D. (hon.), Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Robert W. Stringall, Ph.D., Professor Emeritus  
 Takayuki Tamura, D.Sc., Professor Emeritus  
 Howard J. Weiner, Ph.D., Professor Emeritus

**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, students plan an upper division program in consultation with a faculty adviser. This individualized program can lead to graduate study in pure or applied mathematics, to elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computer science, statistics, or applied mathematics, 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        |
| <b>Preparatory Subject Matter</b> .....          | <b>37-41</b> |
| Mathematics 12 (or high school equivalent) ..... | 0-3          |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....   | 22           |

|                                                                                                                |              |
|----------------------------------------------------------------------------------------------------------------|--------------|
| Computer Science Engineering 30 or Engineering 5 .....                                                         | 3-4          |
| Physics 9A .....                                                                                               | 4            |
| Additional non-Mathematics courses chosen from natural sciences .....                                          | 8            |
| <b>Depth Subject Matter</b> .....                                                                              | <b>36</b>    |
| Mathematics 108 .....                                                                                          | 4            |
| Mathematics 127A, 127B .....                                                                                   | 8            |
| Mathematics 149A, 149B; or 150A, 150B .....                                                                    | 8            |
| Choose one Track from the following two .....                                                                  | 16           |
| <b>Track 1: Secondary Teaching</b>                                                                             |              |
| Mathematics 115A .....                                                                                         | 3            |
| Mathematics 141 .....                                                                                          | 3            |
| Additional upper division units .....                                                                          | 10           |
| Recommended: Mathematics 115B, 115C, 116, 145, 167, 168; Mathematics 131 (Statistics 131A may be substituted). |              |
| <b>Track 2: General Mathematics</b>                                                                            |              |
| Additional upper division units .....                                                                          | 16           |
| <b>Total Units for the Major</b> .....                                                                         | <b>73-77</b> |

**B.S. Major Requirements:**

|                                                                                                                                    |              |
|------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                    | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                            | <b>30-41</b> |
| Mathematics 12 (or high school equivalent) .....                                                                                   | 0-3          |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....                                                                                     | 22           |
| Computer Science Engineering 30 or Engineering 5 .....                                                                             | 3-4          |
| Physics 9A, 9B, 9C (Tracks 1 and 2 only) .....                                                                                     | 12           |
| Physics 9A (Track 3 only) .....                                                                                                    | 4            |
| Statistics 13, 32, or 102 (Track 4 only) .....                                                                                     | 3-4          |
| <b>Depth Subject Matter</b> .....                                                                                                  | <b>45</b>    |
| Mathematics 108 .....                                                                                                              | 4            |
| Mathematics 127A, 127B .....                                                                                                       | 8            |
| Choose one Track from the following four .....                                                                                     | 33           |
| <b>Track 1: Preparation for Graduate Study in Mathematics</b>                                                                      |              |
| Mathematics 127C .....                                                                                                             | 4            |
| Mathematics 150A, 150B, 150C .....                                                                                                 | 12           |
| One course from Mathematics 125, 126, 147 .....                                                                                    | 3            |
| Additional upper division units .....                                                                                              | 14           |
| Recommended: Mathematics 114, 118A, 118B, 118C, 119A, 119B, 125, 126, 141, 145, 147, 185A, 185B.                                   |              |
| <b>Track 2: Applied Mathematics</b>                                                                                                |              |
| Mathematics 150A, 150B .....                                                                                                       | 8            |
| Mathematics 167 .....                                                                                                              | 3            |
| Two courses from Mathematics 128A, 128B, 128C .....                                                                                | 8            |
| Additional upper division units .....                                                                                              | 14           |
| Recommended: Mathematics 118A, 118B, 118C, 119A, 119B, 145, 168, 185A, 185B, Mathematics 131 (Statistics 131A may be substituted). |              |
| <b>Track 3: Mathematics for Secondary Teaching</b>                                                                                 |              |
| Mathematics 115A .....                                                                                                             | 3            |
| Mathematics 141 .....                                                                                                              | 3            |
| Mathematics 149A, 149B; or 150A, 150B .....                                                                                        | 8            |
| Additional upper division units .....                                                                                              | 19           |
| Recommended: Mathematics 115B, 115C, 145, 167, 168; Mathematics 131 (Statistics 131A may be substituted).                          |              |
| <b>Track 4: General Mathematics</b>                                                                                                |              |
| Mathematics 149A, 149B; or 150A, 150B .....                                                                                        | 8            |
| Additional upper division units .....                                                                                              | 25           |
| <b>Total Units for the Major</b> .....                                                                                             | <b>75-86</b> |

**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.** D.W. Barnette, J.R. Diederich, J. Gravner, C. Hom, E.O. Milton, M. Mulase, E.M. Silvia.

**Depth Subject Matter Requirements.** Certain mathematically oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 36-unit or 45-unit requirements with prior departmental approval. For the 190-level courses, (1) a maximum of one unit of 190, 192, 197TC, 198, and 199 courses may be counted towards mathematics major requirements; (2) up to 3 units of Mathematics 194H may be counted towards mathematics major requirements. No combination of (1) and (2) are to be allowed.

**Statement of Objectives.** As early as possible, but no later than the last quarter of the sophomore year, each prospective mathematics major should choose, in consultation with an adviser, one of the tracks as suggested by the adviser, prepare a statement of his or her mathematics objectives, and have a proposed program satisfying the requirements of the chosen track. The form to be used for this statement is available from the Department, and must be submitted in time to receive final approval prior to the last day of instruction of the first quarter of the junior year. Prospective mathematics majors transferring to the University at the upper division level should consult an adviser immediately upon arrival.

**Information for Undergraduates.** Assistance in planning an undergraduate major program in mathematics should be obtained from a major adviser. In addition, students seeking information pertaining to the application of mathematics to the biological or social sciences or computer science may contact the appropriate special area adviser.

Students preparing for an A.B. degree for secondary teaching or general mathematics, or an B.S. degree for graduate study, biological sciences, physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

**Qualifying Examination.** Among the prerequisites for taking Mathematics 12, 16A, 21A, 21AH, 36, and 63 is a passing score on the Qualifying Examination, and, in the cases of all the above courses except Mathematics 12, a passing score on the examination's trigonometric component. **This examination is to be taken on this campus.** Students are responsible for finding out their scores, which are available within 72 hours of the examination, at the Learning Skills Center, and for retaining the printout of their scores. Students who do not pass the examination will be administratively dropped from the courses mentioned above. Dates and times when the examination is offered are posted at the Mathematics Department.

**Prerequisite Credit.** No student may repeat a course, if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

**Minor Program Requirements:**

|                                                                                           |           |
|-------------------------------------------------------------------------------------------|-----------|
|                                                                                           | UNITS     |
| <b>Mathematics</b> .....                                                                  | <b>20</b> |
| Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199) ..... | 20        |

**Teaching Credential Subject Representative.** G.T. Sallee. See also under Teacher Education Program.

**Graduate Study.** The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

**Courses in Mathematics (MAT)**

**Lower Division Courses**

**B. Elementary Algebra** (no credit) I. The Staff 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.)

**C. Trigonometry** (no credit) I, II. The Staff 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.)

**\*D. Intermediate Algebra** (no credit) I, II.

The Staff

Lecture—3 hours. Basic concepts of algebra, designed to prepare the 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.)

**12. Precalculus** (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: Two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Qualifying 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, 21A, 21B, or 21C with a C– or better.

(Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses.)

**16A. Short Calculus** (3) I, II, III. The Staff

(Chairperson in charge)

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. 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 course 21A. GE credit: SciEng.

**16B. Short Calculus** (3) I, II, III. The Staff

(Chairperson in charge)

Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have received credit for course 21B. GE credit: SciEng.

**16C. Short Calculus** (3) I, II, III. The Staff

(Chairperson in charge)

Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have received credit for course 21C. GE credit: SciEng.

**21A. Calculus** (4) I, II, III. The Staff

Lecture/discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 12, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. 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. Only two units of credit will be allowed to students who have credit for course 16A. Not open for credit to students who have completed course 16B. GE credit: SciEng.

**\*21AH. Honors Calculus** (4) I. The Staff

Lecture/discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A. GE credit: SciEng.

**21AL. Emerging Scholars Program Calculus**

**Workshop** (2) I. The Staff

Workshop—6 hours. Prerequisite: concurrent enrollment in course 21A. 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. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

**21B. Calculus** (4) I, II, III. The Staff

Lecture/discussion—4 hours. 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 integrals, surface of revolution. Only two units of credit will be allowed to students who have received credit for course 16B or 16C. GE credit: SciEng.

**\*21BH. Honors Calculus** (4) II. The Staff

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. GE credit: SciEng.

**21BL. Emerging Scholars Program Calculus**

**Workshop** (2) II. The Staff

Workshop—6 hours. Prerequisite: course 21A or 21AH, concurrent enrollment in course 21B. 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 integrals, surface of revolution. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

**21C. Calculus** (4) I, II, III. The Staff

Lecture/discussion—4 hours. Prerequisite: course 21B or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems. GE credit: SciEng.

**\*21CH. Honors Calculus** (4) III. The Staff

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.

**21CL. Emerging Scholars Program Calculus**

**Workshop** (2) III. The Staff

Workshop—6 hours. Prerequisite: course 21B or 21BH, concurrent enrollment in course 21C. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

**21D. Vector Analysis** (4) I, II, III. The Staff

Lecture/discussion—4 hours. Prerequisite: course 21C. Vector algebra, vector calculus, scalar and vector fields. Line and surface integrals. Green's theorem, Stokes' theorem, divergence theorem. (Former course 22C.)

**\*21M. Accelerated Calculus** (5) I. The Staff

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 Qualifying 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. GE credit: SciEng.

**22A. Linear Algebra** (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms.

**22B. Differential Equations** (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: courses 21C, 22A. Solutions of elementary differential equations.

**\*36. Fundamentals of Mathematics** (3) I.

The Staff

Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. Intro-

duction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have received credit for course 108. Recommended for non-math majors. GE credit: SciEng.

**\*63. Ideas from Mathematics** (3) II. The Staff

Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. In-depth treatment of some mathematical ideas, selected from all branches of mathematics, and their applications. Concepts, techniques of rigorous proofs and problem solving are emphasized. Intended for students who want to think about some deeper aspects of mathematics. Not open for credit to students who have taken course 108. GE credit: SciEng.

**71A-71B. Explorations in Elementary**

**Mathematics** (3-3) I-II. The Staff (Chairperson in charge)

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.)

**90. Elementary Problem Solving Seminar** (1) I,

II, III. Quastel

Seminar—1 hour. Prerequisite: high school mathematics. Students solve and present solutions to challenging and interesting problems in elementary mathematics at the board. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II,

III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**108. Introduction to Abstract Mathematics** (4) I,

II, III. The Staff

Lecture/discussion—4 hours. Prerequisite: course 21B or consent of instructor. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments. GE credit: Wrt.

**\*114. The Theory of Convex Sets** (3) III.

The Staff

Lecture—3 hours. Prerequisite: courses 21C, 22A, 108; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in alternate years.

**115A. The Theory of Numbers** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 108. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers.

**\*115B. The Theory of Numbers** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 108. Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years.

**\*115C. The Theory of Numbers** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in alternate years.

**\*116. Metric Differential Geometry** (3) III.

The Staff

Lecture—3 hours. Prerequisite: courses 22A, 21D; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in alternate years.

**118A. Partial Differential Equations:**

**Elementary Methods** (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 22A, 22B, 21D. 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 non-homogeneous equations.

**118B. Partial Differential Equations:**

**Eigenfunction Expansions** (3) II. The Staff  
Lecture—3 hours. 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.

**118C. Partial Differential Equations: Green's**

**Functions and Transforms** (3) III. The Staff  
Lecture—3 hours. 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.

**119A-119B. Ordinary Differential Equations**

**and Dynamical Systems** (3-3) II-III. The Staff  
Lecture—3 hours. Prerequisite: courses 22A, 22B. Scalar and Planar Autonomous Systems—nonlinear systems and linearization. Phase plane analysis. Classification of singular points. Scalar and Planar maps. Bifurcations and the implicit function theorem. Notions of stability and Liapunov's method. Periodic orbits and their bifurcations. Poincare Bendixon theory.

**121A. Advanced Calculus for the Sciences** (3)

I. The Staff  
Lecture—3 hours. Prerequisite: courses 21D, 22A, 22B. Functions of a single real variable; power series, convergence, continuity, differentiation, integration, interchange of limiting procedures, Fourier series, integral transforms. Intended primarily for students majoring in science and engineering.

**\*121B. Advanced Calculus for the Sciences** (3)

II. The Staff  
Lecture—3 hours. Prerequisite: course 121A. Functions of several real variables; continuity, differentiation, implicit functions, integration, calculus of variations, vector analysis. Elementary single complex variable theory. Intended primarily for students majoring in science and engineering.

**\*125. Introduction to Mathematical Logic** (3) I.

The Staff  
Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in alternate years.

**\*126. Introduction to the Theory of Sets** (3) III.

The Staff  
Lecture—3 hours. Prerequisite: course 127A or 150A. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in alternate years.

**127A-127B-127C. Advanced Calculus** (4-4-4)

I, II-III, III-III, I. The Staff  
Lecture/discussion—4 hours. Prerequisite: courses 21D, 22A, 108. Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

**128A. Numerical Analysis** (4) I. The Staff

Lecture—3 hours; term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

**128B. Numerical Analysis in Solution of**

**Equations** (4) II. The Staff  
Lecture—3 hours; term project. Prerequisite: courses 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

**128C. Numerical Analysis in Differential**

**Equations** (4) III. The Staff  
Lecture—3 hours; term project. Prerequisite: courses 22A, 22B, and a knowledge of a programming language such as Pascal, FORTRAN or BASIC. Difference equations, operators, numerical solution of ordinary and partial differential equations.

**131. Methods of Mathematical Probability** (4) II.

The Staff  
Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; discrete,

continuous distributions; random variables; joint, marginal conditional densities; transformation; expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability models via conditioning; tables. Students who have taken Statistics 131A may not receive credit for this course.

**132A-132B. Introduction to Stochastic**

**Processes** (3-3) III-I. The Staff  
Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queueing theory, Brownian motion, stationary processes. Course 132B is offered in alternate years.

**141. Euclidean Geometry** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 108. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries.

**145. Combinatorial Mathematics** (3) III.

The Staff  
Lecture—3 hours. Prerequisite: course 108. Combinatorial methods using basic graph theory counting methods, generating functions, and recurrence relations.

**147. Topology** (3) III. The Staff (Chairperson in

charge)  
Lecture—3 hours. Prerequisite: courses 108, 127A. Basic notions of point-set and combinatorial topology. Offered in alternate years.

**149A-149B. Topics in Discrete Mathematics** (4)

II, III. The Staff (Chairperson in charge)  
Lecture/discussion—4 hours. Prerequisite: courses 22A and 108. Coding theory and counting theory and the algebraic concepts needed in their development.

**150A-150B-150C. Introduction to Abstract**

**Algebra** (4-4-4) I, II, III. The Staff  
Lecture/discussion—4 hours. Prerequisite: course 108. Basic concepts of groups, rings, and fields. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstraction.

**\*160. Mathematical Foundations of Database**

**Theory, Design, and Performance** (3) I. Diederich  
Lecture—3 hours. Prerequisite: course 108 and familiarity with one high-level computer language. The 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.

**\*164. Mathematical Foundations of Fifth**

**Generation Computing** (3) II. Milton  
Lecture—3 hours. Prerequisite: course 108 and a knowledge of a modern high-level computer language. Study of the uses of predicate and various logics in knowledge-based systems. Resolution and non-resolution deduction, forward and backward deduction systems, logic programming, symbolic integration, problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

**167. Linear Algebra and Applications** (3) I, II,

III. The Staff (Chairperson in charge)  
Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

**168. Mathematical Programming** (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 21C, and 22A or 167; knowledge of a programming language. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization.

**\*180. Special Topics: Pure and Applied**

**Mathematics** (3) I, II, III. The Staff  
Lecture—3 hours. Prerequisite: course 22A and 22B, or consent of instructor. Special topics from various

fields of pure and applied mathematics, such as: analysis, algebra, applied mathematics, geometry, topology, computer science, logic, history. May be repeated for credit when topic differs.

**185A. Functions of a Complex Variable with**

**Applications** (3) II. The Staff (Chairperson in charge)  
Lecture—3 hours. Prerequisite: course 21D. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

**185B. Functions of a Complex Variable with**

**Applications** (3) III. The Staff (Chairperson in charge)  
Lecture—3 hours. Prerequisite: course 185A or consent of instructor. Analytic 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.

**190. Advanced Problem Solving Seminar** (1) I,

II, III. Quastel  
Seminar—1 hour. Prerequisite: two years of college mathematics. Students solve and present solutions to challenging and unusual problems at the board. The problems require a background in, at most, second-year university mathematics. May be repeated once for credit. (P/NP grading only.)

**192. Internship in Applied Mathematics** (1-3) I,

II, III. The Staff (Chairperson in charge)  
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.)

**194. Undergraduate Thesis** (3) I, II, III. The Staff

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.)

**197TC. Tutoring Mathematics in the Community**

(1-5) I, II, III. The Staff (Chairperson in charge)  
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 once for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced**

**Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses****201A-201B-201C. Analysis** (4-4-4) I, II, III.

The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 127 or 203C. Metric and topological spaces. Banach and Hilbert spaces. Completion. Compactness. Abstract measure space. Lebesgue measures and integrals. LP spaces. Distributions and the Fourier transform. Operators.

**\*202. Functional Analysis** (4) II. The Staff

Lecture—3 hours; term paper. Prerequisite: course 201A-201B-201C. The theory of Fredholm operators. Examples of Fredholm operators (singular integral operators, elliptic operators in Sobolev spaces). Index theory for Fredholm operators. Unbounded self-adjoint operators. Schrodinger operators and other differential operators. The spectral theorem for these and for unitary operators. Offered in alternate years.

**203A-203B-203C. Modern Applied Analysis**

(4-4-4) I-II-III. The Staff  
Lecture—3 hours; term paper or discussion. Prerequisite: graduate standing or consent of instructor. Classical mathematical foundations leading to modern analysis. Linear and metric spaces; Hilbert space; operator theory. Applications to integral and differential equations. Variational methods.

**\*204. Applied Asymptotic Analysis (4) I.**

The Staff

Lecture—3 hours; term paper or discussion. Prerequisite: graduate standing or consent of instructor. Asymptotic analysis and perturbation theory, with applications to optimization, differential equations, and scaling. Offered alternate years.

**205. Complex Analysis (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Theory of holomorphic functions. Riemann mapping theorem and analytic continuation.

**210A. Topics in Geometry (3) I.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced geometry related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210AL. Topics in Geometry: Discussion (1) I.**

The Staff (Chairperson in charge)

Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210A (concurrently); consent of instructor. Special topics related to course 210A which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**210B. Topics in Algebra (3) II.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced algebra related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210BL. Topics in Algebra: Discussion (1) II.**

The Staff (Chairperson in charge)

Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210B (concurrently); consent of instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**210C. Topics in Analysis (3) III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced analysis related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210CL. Topics in Analysis: Discussion (1) III.**

The Staff (Chairperson in charge)

Lecture/discussion—1 hour (to be arranged). Prerequisite: course 210C (concurrently); consent of instructor. Special topics related to course 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**\*215A-215B-215C. Topology (4-4-4) I-II-III.**

The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in alternate years.

**\*218A-218B. Partial Differential Equations (4-4) II-III.**

The Staff

Lecture—3 hours; term paper or discussion. Prerequisite: courses 22A, 127C. Initial and boundary value problems for elliptic, parabolic and hyperbolic partial differential equations; existence, uniqueness and regularity for linear and nonlinear equations; maximum principles; weak solutions, Holder and Sobolev spaces, energy methods; Euler-Lagrange equations.

**\*219. Ordinary Differential Equations (3) I.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: courses 22A, 22B, 127C. Existence and uniqueness theorems for ordinary differential equations; linear systems; Sturm-Liouville theory; nonlinear ordinary differential equations. Offered in alternate years.

**\*221A-221B. Mathematical Fluid Dynamics (3-3) I-II.**

The Staff

Lecture—3 hours. Prerequisite: course 118B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous fluids. Offered in alternate years.

**222. Introduction to Biofluid Dynamics (3) III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: Population Biology 231/Ecology 231 and Neurobiology, Physiology and Behavior 245 or consent of instructor. The basic principles of fluid dynamics are introduced in the first half of the course by describing various phenomena studied from a biofluids perspective. The equations of fluid motion associated with these phenomena are derived and studied in the second half.

**227. Scientific Computation Applied to Problems in Biology (4) I.**

The Staff

Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Numerical solution of differential equations is studied using programming environments such as Maple, Mathematica and Matlab. Emphasis on understanding why numerical algorithms work. Particular attention to the application of these algorithms to problems in biology.

**\*228A-228B-228C. Numerical Solution of Differential Equations (4-4-4) I-II-III.**

The Staff

Lecture—3 hours; term paper or discussion. 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.

**\*229A-229B. Numerical Methods in Linear Algebra (4-4) I-II.**

The Staff

Lecture—3 hours; term paper or discussion. Prerequisite: consent of instructor. Computational methods for the solution of linear algebraic equations and matrix eigenvalue problems. Analysis of direct and iterative methods. Special methods for sparse matrices. Offered in alternate years.

**\*235A-235B-235C. Probability Theory (3-3-3) I-II-III.**

The Staff

Lecture—3 hours. Prerequisite: course 127C and Statistics 131A-131B or the equivalent. Measure theoretic foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Statistics 235A-235B-235C.)

**\*236A-236B. Stochastic Dynamics and Applications (3-3) I-II.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 201C or 235B. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, martingales, stochastic differential equations. Applications and advanced topics.

**\*240A-240B-240C. Differential Geometry (3-3-3) I-II-III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 116 or consent of instructor. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms. DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in alternate years.

**250A-250B-250C. Algebra (4-4-4) I-II-III.**

The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in Mathematics or consent of instructor. Theory of groups, rings, and fields.

**\*258A. Numerical Optimization (4) II.**

Lecture—3 hours; term paper or discussion. Prerequisite: courses 127A, 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.

**\*258B. Numerical Optimization (4) III.**

Lecture—3 hours; term paper. Prerequisite: course 258A. Provides the students with the mathematical foundations to deal with optimization and variational problems.

**\*261A-261B. Lie Groups and Their Representations (3-3) II-III.**

The Staff

Lecture—3 hours. Prerequisite: courses 215A, 240A, 250A-250B. Mathematical theory of Lie groups and Lie algebras, including the classification of semi-simple Lie groups. Representations of Lie groups, weights and characters, the Weil character formulas. Infinite-dimensional Lie groups, Kac-Moody algebras and the Virasoro algebra. Offered in alternate years.

**280. Topics in Pure and Applied Mathematics (3) I, II, III.**

The Staff

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.

**290. Seminar (1-6) I, II, III.**

The Staff (Chairperson in charge)

Advanced study in various fields of mathematics, including the following: algebraic theory of semi-groups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (S/U grading only.)

**298. Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: graduate standing.

**299. Individual Study (1-12) I, II, III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: graduate standing.

**299D. Dissertation Research (1-12) I, II, III.**

The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: graduate standing.

**Professional Course****390. Methods of Teaching Mathematics (3) I, II, III.**

The Staff

Lecture—1 hour; discussion—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical experience in methods and problems of the teaching of mathematics at the university level. Includes discussion of lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and related topics. Required of departmental teaching assistants. May be repeated for credit. (S/U grading only.)

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## Medical Microbiology

**See Medicine, School of**

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## Medical Pharmacology and Toxicology

**See Medicine, School of**

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## Medicine

**See Medicine, School of; and Medicine and Epidemiology (Veterinary Medicine)**



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 James J. Castles, M.D., Executive Associate Dean  
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 Daniel C. West, M.D., Assistant Professor (*Pediatrics*)  
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Human Anatomy, Obstetrics and Gynecology*)  
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and Preventive Medicine*)  
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 Hanspeter Witschi, M.D., Professor (*Internal Medicine*)  
 Bruce M. Wolfe, M.D., Professor (*Surgery*)  
 David L. Woods, Ph.D., Adjunct Professor  
(*Neurology*)  
 Reen Wu, Ph.D., Professor (*Internal Medicine*)  
 Theodore Wun, M.D., Assistant Professor  
(*Internal Medicine*)  
 Sanjay Yadlapalli, M.B., B.S., Assistant Clinical  
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(*Internal Medicine*)  
 Ken Yomeda, M.D., Assistant Professor (*Internal  
Medicine*)  
 Douglas Zatzick, M.D., Assistant Professor  
(*Psychiatry*)  
 Vincent Ziboh, Ph.D., Professor  
(*Dermatology, Biological Chemistry*)  
 Rebecca Zulim, M.D., Assistant Clinical Professor  
(*Surgery*)

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 C. Robert Ashmore, Ph.D., Professor Emeritus  
 Neil C. Andrews, M.D., Professor Emeritus  
 Len H. Andrus, M.D., Professor Emeritus  
 Alexander Barry, Ph.D., Professor Emeritus  
 Charles J. Beauchamp, M.D., Ph.D., Professor  
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 Eli Benjamini, Ph.D., Professor Emeritus  
 Edmund Bernauer, Ph.D., Professor Emeritus  
 Kay H. Blacker, M.D., Professor Emeritus  
 Robert J. Bolt, M.D., Professor Emeritus  
 George H. Cardinet III, D.V.M., Ph.D., Professor  
Emeritus  
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 Elliot Goldstein, M.D., Professor Emeritus  
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 Paul F. Gulyassy, M.D., Professor Emeritus  
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**Admission Requirements and Professional Curriculum.** Detailed information can be obtained from the School of Medicine. See also the School of Medicine chapter of this catalog.

## 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 training for the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research. While the first two years emphasize the basic science basis of medicine, the student is exposed even from the onset to questions of patient management, thus providing a natural transition from the entry pregraduate training into the clinical training of the final two years.

The first-year program is for three quarters, beginning in the fall. The basic sciences (anatomy, physiology, biochemistry, histology, endocrinology, neurosciences, immunology, general pathology) are blended with social sciences (the behavioral aspects of medicine), and students are introduced to the art of communicating with patients, and emergency medicine.

The second-year program is for four quarters, but with the Summer Quarter abbreviated to six weeks. The Summer Quarter provides a transition between basic and clinical sciences with the presentation of systematic pathology, and courses on the integumentary system and reproductive system. In the remaining three quarters, the students complete their training in basic sciences (pharmacology, microbiology) and are then, from an organ system approach, presented the pathophysiological basis of disease (endocrine, hematopoietic/lymphoreticular, gastrointestinal, nutrition, musculoskeletal, neuromuscular, respiratory, nephrology). During the second year, students continue training in physical diagnosis and are presented with issues in community health, occupational medicine, psychopathology, and human sexuality.

The third-year program is comprised of required clerkship rotations in the clinical specialties: eight weeks each of surgery, medicine, obstetrics/gynecology, pediatrics, primary care plus (four weeks family practice, two weeks each orthopaedics and urology) and psychiatry. Either obstetrics/gynecology or psychiatry may be deferred until the fourth year.

The fourth year features built-in flexibility to allow students to begin to individualize their medical careers. All students are required to take two weeks of physical medicine and rehabilitation, two weeks of neurology, two weeks of ophthalmology, two weeks of otolaryngology, four weeks of emergency care and 18 weeks of clinical selectives. A two-week course on responsibilities of medical practice (medical ethics, jurisprudence and medical economics) is also required. The fourth-year curriculum also provides 12 weeks of undesigned time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. 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 some opportunity for selecting electives during the first two years, in particular during the interim period between the 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. In addition, the UC Berkeley School of Public Health offers an M.P.H. program in conjunction with the M.D. program.

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 campuswide Ph.D. programs, including those in social sciences and humanities. The UC Davis School of Medicine awards two competitive fellowships each year to students enrolled in the M.D./Ph.D. program.

The Sierra Health Foundations MD/MBA Fellows Program attracts academically outstanding students who are committed to a career in health care leadership and who desire to remain in Northern California. Selected students will embark upon a six-year course that will result in a degree in Medicine from the UC Davis School of Medicine and an M.B.A. in Health Services Management from the UC Davis Graduate School of Management. Students receive funding for tuition and fees for the full six years of the 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**

|                                                                                       |       |
|---------------------------------------------------------------------------------------|-------|
|                                                                                       | UNITS |
| <b>Quarter I: Fall</b>                                                                |       |
| Biological Chemistry 410A, Molecular and Cell Biology .....                           | 4.5   |
| Family Practice 400A, Introduction to Patient Evaluation.....                         | 2     |
| Cell Biology and Human Anatomy 400, Developmental, Gross and Radiologic Anatomy ..... | 9     |
| Psychiatry 401, Medicine and the Mind.....                                            | 2     |

**Quarter II: Winter**

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| Biological Chemistry 410B, Cell Biology and Metabolism.....        | 3.5 |
| Cell Biology and Human Anatomy 402, Human Microscopic Anatomy..... | 5   |
| Human Physiology 400, Human Physiology.....                        | 8   |
| Family Practice 400B, Introduction to Patient Evaluation.....      | 2   |

**Quarter III: Spring**

|                                                                                          |     |
|------------------------------------------------------------------------------------------|-----|
| Biological Chemistry/Human Physiology 418, Mammalian Endocrinology and Homeostasis ..... | 4.5 |
| Cell Biology and Human Anatomy/Human Physiology 403, Neurobiology .....                  | 5   |
| Medical Microbiology 480A, Medical Immunology .....                                      | 2.5 |
| Pathology 410A, General Systemic Pathology .....                                         | 4.5 |
| Family Practice 400C, Introduction to Patient Evaluation.....                            | 2   |

**Second-Year Required Courses**

**Quarter IV: Summer**

|                                                     |     |
|-----------------------------------------------------|-----|
| Pathology 410B, General Systemic Pathology .....    | 7.5 |
| Obstetrics and Gynecology, Human Reproduction ..... | 2   |
| Dermatology 420, Integumentary System.....          | 2   |
| Internal Medicine 400A, Physical Diagnosis .....    | 1   |

**Quarter V: Fall**

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| Medical Microbiology 480B, Pathogenic Microbiology.....                     | 6.5 |
| Internal Medicine 420A, Hematopoietic and Lymphoreticular System.....       | 5   |
| Orthopaedic Surgery 420, Musculoskeletal System .....                       | 2.5 |
| Medical Pharmacology and Toxicology 400A, Principles of Pharmacology A..... | 2.5 |

|                                                                                                                                  |     |
|----------------------------------------------------------------------------------------------------------------------------------|-----|
| Community and International Health/Internal Medicine 421, Principles of Epidemiology, Occupational Medicine and Geriatrics ..... | 2.5 |
| Internal Medicine 400B, Physical Diagnosis .....                                                                                 | 3   |

**Quarter VI: Winter**

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| Medical Pharmacology and Toxicology 400B, Principles of Pharmacology B..... | 6   |
| Internal Medicine 420C, Respiratory System .....                            | 4   |
| Internal Medicine 420D, Cardiovascular System .....                         | 3.5 |
| Neurology 420, Clinical Neurosciences .....                                 | 4   |
| Psychiatry 403, Psychopathology .....                                       | 3.5 |
| Psychiatry 402, Human Sexuality.....                                        | 1   |
| Internal Medicine 400C, Physical Diagnosis .....                            | 3   |

**Quarter VII: Spring**

|                                                                                |     |
|--------------------------------------------------------------------------------|-----|
| Internal Medicine 420F, Metabolic-Regulatory System .....                      | 3.5 |
| Internal Medicine 420B, Gastrointestinal System .....                          | 3.5 |
| Internal Medicine/Biological Chemistry 419, Basic and Clinical Nutrition ..... | 2   |
| Internal Medicine 420E, Nephrology.....                                        | 4   |

**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 Practice 430, Primary Care Plus Clerkship ..... | 8 weeks |

**Third or Fourth Year Clerkships**

|                                                                          |         |
|--------------------------------------------------------------------------|---------|
| Obstetrics and Gynecology 430, Obstetrics and Gynecology Clerkship ..... | 8 weeks |
| Psychiatry 430, Psychiatry Clerkship.....                                | 8 weeks |

**Fourth Year Requirements**

|                                                                                                |           |
|------------------------------------------------------------------------------------------------|-----------|
| Physical Medicine and Rehabilitation 440, Physical Medicine and Rehabilitation Clerkship ..... | 2 weeks   |
| Medical Sciences 440, Responsibilities of Medical Practice .....                               | 2 weeks   |
| Neurology Clerkship.....                                                                       | 2-4 weeks |
| Ophthalmology.....                                                                             | 2 weeks   |
| Otolaryngology.....                                                                            | 2 weeks   |
| Emergency Care .....                                                                           | 4 weeks   |
| Clinical Selectives .....                                                                      | 18 weeks  |

Clinical selectives are chosen by the student in consultation with, and with approval of, the Fourth Year Oversight Committee. Of the 18 weeks of selective time, at least eight weeks must be in medicine, four weeks in surgery, and four weeks in an ambulatory setting. The ambulatory requirement can be met concurrently while taking medicine or surgery. Clinical selectives may be taken at an approved away site.

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) I, II, III, IV. Walsh 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.)

**Upper Division Course**

**192. Medical Education Internship for Advanced Undergraduates** (1-12) I, II, III, summer. Walsh

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.)

**Professional Courses**

**401. Applications of Computers to Medical Practice** (2) I, II, III, IV. Huntley

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. (S/U grading only.)

**410. Providing Medical Education and Practice Resources for Electronic Access** (4) I. Huntley

Lecture—2 hours; laboratory/discussion—6 hours. Prerequisite: basic proficiency in programming language or scripting (PERL or C preferred). Survey of existing electronic education and reference resources for medical practice, review of the methods and limits of creating and providing text and image material, and guide to becoming a medical resource provider in the Internet.

**440. Responsibilities of Medical Practice** (3) II. Loewy and staff

Lecture/discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nonbiological components of the patient-physician relationship (medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical and cultural issues arising in medical practice. (S/U grading only.)

**441. Combined Ophthalmology and Otolaryngology Clerkship** (6) I, II, III, IV. Brandt, Brodie

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 & throat problems at a level of training of general physicians, including when to refer patients to a specialist.

**450. Introduction to UCD Medical Center** (1) III. The Staff

Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (S/U grading only.)

**480. Insights in Clinical Research** (1) II. Walsh Lecture—1 hour. Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (S/U grading only.)

**481. Insights into Clinical Specialties** (1) II. Walsh

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. (S/U grading only.)

**489. Directed Studies** (9) I, II, III, IV. Lewis Independent study—40 hours weekly. Prerequisite: individual directed studies in extended preparation for USMLE Part I, and/or as required by Promotion Board. Independent studies to review material from Years I and II in the curriculum in preparation for taking USMLE Part I in the fall, and for remediation course work directed by the Promotion Board. Students are expected to spend 8 to 12 hours per day on these studies. Faculty consultation and tutoring available on

individual basis. May be repeated for credit. (S/U grading only.)

**495. Medicine Literature Review** (1-9) I, II, III, IV. Walsh

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. (S/U grading only.)

**499. Research in Medical Education and Curriculum Development** (4-9) I, II, III, IV. Walsh  
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 M.D. curriculum at UC Davis. (S/U grading only.)

## Departmental Courses:

### Anesthesiology (ANE)

#### Upper Division Course

**192. Internship in Anesthesiology** (1-6) I, II, III, IV. The Staff

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.)

#### Professional Courses

**460. Anesthesiology Clinical Clerkship** (3-18) I, II, III, IV. (Kantor in charge)

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.

**462. Anesthesiology** (3) I, II. Kantor  
Clinical activity—full time. Prerequisite: medical student (geared toward second and third-year students). Exposure to anesthesiology through combination of informal lectures and mentoring by anesthesiologists. Anesthetic procedures, pharmacology, and basic anesthetic principles.

**463. Medical and Surgical Pain Management** (2) I, II, III, IV. Richeimer

Clinical activity—20 hours; lecture/discussion—1 hour. Prerequisite: medical students in good standing, with consent of instructor. Round mornings with Acute Pain Service (5 half days/week for 2 weeks.) Rounds are interactive and instructional for understanding acute pain and treatment regimes. Chronic Pain Clinic follows, to observe a wider range of pain conditions and management strategies. (S/U grading only.)

**480. Brief Introduction to Clinical Anesthesiology and Chronic Pain Management** (3) II. Jahr, Kantor

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. (S/U grading only.)

**498. Individual or Group Study** (1-5) I, II, III, IV. Richeimer and staff

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.

**499. Anesthesiology Research** (4-18) I, II, III, IV. Gronert and staff

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 lab-

oratory research. (S/U grading only for medical students.)

## Biological Chemistry (BCM)

### Lower Division Course

**92. Internship in Biological Chemistry** (1-12) I, II, III, IV. The Staff

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

**131. Introduction to Magnetic Resonance in Biology** (2) III. Jue

Lecture—2 hours. Prerequisite: Chemistry 8B or 118B or 128B. Fundamental concepts in magnetic resonance and their application to protein structure determination. Theoretical and experimental methods. Two-dimensional NMR techniques. Offered in alternate years.

**192. Internship in Biological Chemistry** (1-12) I, II, III, IV. The Staff

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) I, II, III, IV. The Staff

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) I, II, III, IV. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**209. Prostaglandins/Leukotrienes and Related Lipids** (2) II. Ziboh (Dermatology)

Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Oxidative desaturation/elongation of polyunsaturated 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.

**214. Molecular Medicine** (1) II. Seldin  
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance. (S/U grading only.) (Same course as 414.)

**\*217. Molecular Genetics of Fungi** (3) II.

Holland  
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.)

**222. Mechanisms of Translational Control** (2) II. Hershey

Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eucaryotic 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.

**230. Practical NMR Spectroscopy and Imaging** (1) I. The Staff

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.)

**\*231. Biological Nuclear Magnetic Resonance** (3) III. Jue

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. Offered in alternate years. (Same course as Biophysics 231.)

**298. Group Study** (1-5) I, II, III, IV. The Staff  
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

**299. Research** (1-12) I, II, III, IV. The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**410A. Molecular and Cell Biology** (4.5) I. Matthews, Holland

Lecture—5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Applications to clinically relevant systems are emphasized, particularly sickle cell anemia, thalassemias, immunoglobulins and monoclonal antibodies, oncogenes, cell proliferation control.

**410B. Cell Biology and Metabolism** (3.5) II. Jue, Troy

Lecture—4 hours (for 9 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to transport of small molecules and ions across membranes is followed by study of energy metabolism and biosynthetic processes in humans. Membrane receptors are considered as they relate to basic metabolic processes. Correlations to human disease are made throughout.

**414. Molecular Medicine** (1) II. Seldin  
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (S/U grading only.) (Same course as 214.)

**418. Mammalian Endocrinology and Homeostasis** (4.5) III. Walsh and staff

Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system at both the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Human Physiology 418.)

**419. Introduction to Clinical Nutrition** (3) III. Phinney (Internal Medicine, Clinical Nutrition and Metabolism), Rucker, and staff

Lecture—5 hours; lecture/discussion—1.5 hours; laboratory/discussion—0.5 hour (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion/case study. (Same course as Internal Medicine 419.)

**497T. Tutoring in Biological Chemistry** (1-5) I, II, III, IV. The Staff

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutor-



ing medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

**498. Group Study** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: medical students with consent of instructor. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: medical students with consent of instructor. (S/U grading only.)

## Cell Biology and Human Anatomy (CHA)

### Upper Division Courses

**101. Human Gross Anatomy** (4) II. Gross

Lecture—4 hours. Prerequisite: Biological Sciences 1B; concurrent enrollment in course 101L strongly recommended. A detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. GE credit: SciEng.

**101L. Human Gross Anatomy** (3) II. Gross

Laboratory—6 hours; lecture/discussion—3 hours. Prerequisite: course 101 (may be taken concurrently). A detailed study of prosected human cadavers in small group format with extensive hands-on experience. GE credit with concurrent enrollment in 101: Wrt.

**192. Internship in Morphology** (1-12) I, II, III, IV. The Staff

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) II. The Staff

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) I, II, III, IV.

The Staff (Chairperson in charge)  
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) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**200. Gross Anatomy** (8) I. Tucker

Lecture—3.5 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: graduate student and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through dissection and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

**202. Human Microscopic Anatomy** (5) II. Meizel

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.

**203. Neurobiology** (6) III. Kumari

Lecture—5 hours; laboratory—3 hours. Prerequisite: consent of instructor. Gross and microscopic anatomy of the central nervous system; motor and sensory pathways; neurophysiology, and cognitive functions.

**250. Biology of Neuroglia** (2) III. Kumari

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 Neuroscience 250.) (S/U grading only.)

**290. Seminar** (1) I, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**290C. Research Group Conference** (1) I, II, III. The Staff

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.)

**292. Fertilization and Gamete Literature Critique** (1) I, II, III. Meizel

Discussion—1 hour. Prerequisite: consent of instructor. Critical evaluation of current journal articles dealing with cell biology and biochemistry of gametes and fertilization. Selected papers will be presented and discussed in detail by students and faculty. May be repeated for credit. (S/U grading only.)

**298. Advanced Group Study** (1-5) I, II, III, IV. The Staff

Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Course

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

### Professional Courses

**400. Developmental, Gross, and Radiologic Anatomy** (9) I. Tucker and staff

Lecture—6 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dissections. Embryology is covered from implantation to birth.

**402. Human Microscopic Anatomy** (5) II. Meizel and staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. 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 section material at the light microscopic and ultrastructural levels.

**403. Neurobiology** (5) III. Kumari and staff

Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

**497T. Tutoring in Human Anatomy** (1-5) I, II, III, IV. The Staff

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. (S/U grading only.)

**498. Advanced Group Study** (1-12) I, II, III, IV. The Staff

Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff

(Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

## Clinical Psychology (CPS)

### Graduate Course

**299. Research** (1-12) I, II, III, IV. Morrison

Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

## Dermatology (DER)

### Upper Division Courses

**192. Internship in Cutaneous Biology** (1-4) I, II, III, IV. Isseroff

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.)

**199. Special Study in Cutaneous Biology** (1-4)

I, II, III, IV. The Staff (Isseroff in charge)  
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.)

### Graduate Course

**299. Research in Cutaneous Biology** (1-12) I, II, III, IV. The Staff (Isseroff in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.)

### Professional Courses

**420. Integumentary System** (2) IV. Huntley and staff

Lecture/discussion—4 hours (for 6 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Covers cell biology, pathology, and physical diagnosis of the skin and is designed to prepare medical students for clinical service. Recognition of normal variations, and common or important dermatoses is emphasized. Patient demonstrations of select conditions are included.

**460. Dermatology Clinical Clerkship** (6) I, II, III, IV. Lynch

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 UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

**480. Insights in Dermatology** (1-3) I, II, III, IV.

Huntley  
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. (S/U grading only.)

**498. Special Topics in Clinical Dermatology**

(1-6) I, II, III, IV. The Staff (Lynch in charge)  
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. (S/U grading only.)

**499. Research in Cutaneous Biology** (1-12) I, II, III, IV. The Staff (Isseroff in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (S/U grading only.)

## Epidemiology and Preventive Medicine (EPP)

(Formerly courses in Community and International Health)

### Lower Division Course

#### 92. Internship in Community Health (1-12) I, II, III, IV. The Staff

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) III. Schenker and staff

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.

#### 160. Health Education (1-5) I, II, III, IV. The Staff (Student Health Center)

Lecture—1-3 hours; laboratory—3-15 hours. Prerequisite: consent of instructor. Preparation for field work in the area of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (P/NP grading only.)

#### 180. Aging and Health (3) III. The Staff

Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on nature and determinants of health in the elderly. Current social and personal strategies for enhancing and maintaining health in old age.

#### 190C. Research Conference in Community and International Health (1) I. Gold; II. Samuels; III. Haan

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.)

#### 192. Internship in Community Health Practice (1-12) I, II, III, IV. The Staff

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) I, II, III, IV. The Staff

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) I, II, III, IV. The Staff

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

#### 298. Study in Community and International Health (1-5) I, II, III, IV. The Staff

Prerequisite: graduate student in good academic standing and consent of instructor. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.)

#### 299. Research in Community and International Health (1-12) I, II, III, IV. The Staff

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, occupa-

tional and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only for graduate students.)

### Professional Courses

#### 402. Introductory Medical Spanish (2) II, III. Meizel

Lecture/discussion—2 hours. Prerequisite: medical student in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination in Spanish. (S/U grading only; deferred grading only, pending completion of sequence.)

#### 421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. McCurdy and staff

Lecture—7.5 hours for 4 weeks; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology and epidemiologic study design, including measures of morbidity, mortality, and risk. Occupational medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system.

#### 455. Multidisciplinary Clinical Preceptorship (4.5) IV. The Staff

Clinical activity—full time (3 weeks). Prerequisite: second-year student in good academic standing. Students will be introduced to basic principals of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatrics will be emphasized. (S/U grading only.)

#### 460. Geriatrics in Community Health (6-12) I, II, III, IV. Rozance

Discussion—4 hours; clinical activity—full time (4-8 weeks); clinical setting and community needs assessment. Prerequisite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderly to severely infirm.

#### 461. Clerkship in Community Health Group Practice (3-9) I, II, III, IV. The Staff

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.)

#### 465. Community Health Preceptorship (3-18) I, II, III, IV. The Staff

Clinical activity—full time (2-12 weeks). Prerequisite: fourth-year medical student. Students participate at the California Department of Health Services in ongoing 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.

#### 466. Occupational and Environmental

**Medicine Elective (6-12) I, II, III, IV. Schenker**  
Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: fourth-year medical student and consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participate in Ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center. (S/U grading only.)

#### 470. Clinical Selective in Occupational and Environmental Medicine (3) I, II, III, IV. McCurdy and staff

Clinical activity—full time. Prerequisite: fourth-year medical students in good academic standing, with consent of instructor. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and in local industries. Participants will gain experience in evaluating occupational and environmental medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles.

#### 480. Insights in Occupational and Environmental Medicine (1-3) I, II, III, IV. Schenker

Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. Students will 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. Students develop and present small individual research projects. (Former course Occupational and Environmental Health 480.) (S/U grading only.)

#### 481. Senior Partnership (1-3) I, II, III, IV. The Staff

Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student or consent of instructor. Introduction to concepts of geriatric health care. Students are matched with elderly patients from the community for a project on health and aging; field experiences in clinical geriatrics; attendance at SOM lectures concerning geriatrics or the elderly patient. (Former course 480.) (S/U grading only.)

#### 495. International Health Care (1) I. Schenker

Lecture/discussion—1 hour. Prerequisite: medical student in good academic standing. 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.)

#### 498. Study in Community and International Health (1-5) I, II, III, IV. The Staff

Prerequisite: medical student in good academic standing and consent of instructor. Study and experience for medical students in any number of areas in community and international health. (S/U grading only.)

#### 499. Research in Community and International Health (1-9) I, II, III, IV. The Staff

Prerequisite: medical students with 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. (S/U grading only.)

## Family and Community Medicine (FAP)

(Formerly Family Practice.)

### Lower Division Course

#### 92C. Primary Care Clinics (2) I, II, III, IV. Arevalo, Day

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.)

### Upper Division Courses

#### 192A. Internship in Family Practice (1-12) I, II, III, IV. The Staff

Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Work experience supervised in the Department of Family Community Medicine. Upper division students provided an opportunity to acquire research experience in a clinical laboratory setting. (P/NP grading only.)

#### 192C. Primary Care Clinics (2) I, II, III, IV. Arevalo, Day

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; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)

### 195. Health Care to Underserved Populations

(1) II. Nesbitt

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.)

### Graduate Courses

#### 240A-240B-240C-240D-240E-240F. Clinical Preceptorship

(1-13) I, II, III, IV. Hess, De Amicis  
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 twice for credit. (P/NP grading only.)

#### 242A-242B-242C. Clinical Role Seminar

(1-1-1) I, II, III. De Amicis, Trollinger, Collins  
Seminar—1 hour. Prerequisite: enrollment in course 240 and in the Master's Track of the FNP Certificate Program. Course 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. (P/NP grading only.)

#### 252A. Nurse Practitioner as Leader

(1) III. Collins  
Lecture/discussion—1 hour. 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 discussions of pertinent issues, theory and research. May be repeated twice for credit. (Deferred grading only, pending completion of sequence.)

#### 252B. Nurse Practitioner as Leader

(1) I-II-III-IV. DeAmicis  
Lecture/discussion—1 hour. Prerequisite: course 252A and concurrent enrollment in the Master's track of the FNP Certificate Program. Study of advanced practice role of the nurse practitioner. Overview of legal and regulatory issues, certification and malpractice-liability issues. Discussion of grant writing and clinical research. May be repeated twice for credit. (Deferred grading only, pending completion of sequence.)

#### 264. Psychosocial Concepts and Issues in Primary Care

(2) II. Collins  
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.

#### 266A. Health Maintenance/Promotion

(2) I. De Amicis  
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.

#### 266B. Family Nursing Theory

(2) II. Mentink  
Lecture—2 hours. Prerequisite: course 266A and enrollment in the Master's Track of the FNP Certificate Program. Exploration of family theories as related to advanced primary care nursing practice.

#### 266C. Family Nursing Interventions

(2) III. Hass  
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.

#### 266D. Community Assessment and Intervention

(1) II. Trolinger  
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 twice for credit.

### Professional Courses

*The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant (FNP/PA) Program.*

#### 340A-340B-340C-340D. Clinical Preceptorship for FNP/PA Students

(1-18) I-II-III-IV. White, Stewart  
Clinical activity—3-40 hours. Prerequisite: registered student in FNP/PA Program. Student spends 3-40 hours per week with an approved physician preceptor in patient care developing clinical skills necessary to assess and manage patients with common medical problems seen in primary care and long-term care facilities. May be repeated twice for credit.

#### 341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PA Students

(1-18) I-II-III-IV. Hasselbach, White  
Clinical activity—3-40 hours. Prerequisite: registered student in FNP/PA Program, and course 340A-340B-340C. Student spends 3 to 40 hours per week in an approved clinical setting to build on clinical skills in primary care learned in course 340A-340B-340C. Assessment and management of patients with complex and multiple problems. May be repeated twice for credit. (P/NP grading only.)

#### 343. Inpatient Clinical Experience for FNP/PA Students

(5) I, III, III, IV. Trolinger/Morris  
Clinical activity—15 hours. Prerequisite: registered student in the FNP/PA Program, successful completion of course 340A-340B-340C, and consent of instructor. Student clerkships in the inpatient setting in Family Practice, Surgery, and Medical/Surgical subspecialty electives at UCDCM and/or affiliated institutions. Exposes students to inpatient management and acquaints students with FNP/PA role in the inpatient setting. May be repeated for credit. (P/NP grading only; Deferred grading only, pending completion of sequence.)

#### 346. Clinical Geriatrics

(3) I-II-III-IV. Trolinger, Rios  
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.)

#### 350. Ethics and Trends in Health Care for FNP/PA Students

(2) III. Smith, Hass  
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.

#### 353. Geriatric Medicine for FNP/PA Students

(1) II. Trolinger, Rios  
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 twice for credit.

#### 354A-354B-354C. Fundamentals of Primary Health Care for FNP/PA Students

(4-5-4) I-II-III. Emblen, Hoody, Hasselbach, Barakzai, Phillips  
Lecture/discussion—4-5 hours. Prerequisite: registered student in FNP/PA Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care. May be repeated for credit.

#### 355A-355B-355C-355D. Advanced Principles of Health Care for FNP/PA Students

(4-4-4-4) I-II-III. Morris, Emblen, Hoody, Hass, Smith, DeAmicis  
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.

#### 358A. Pharmacology

(1) I, II, III, IV. Emblen, Hasselbach  
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Core knowledge in clinical pharmacology and therapeutics; facts that are necessary to make rational and optimal therapeutic plans in an ambulatory, primary care setting. May be repeated twice for credit.

#### 358B. Pharmacology

(1) I, II, III, IV. Emblen, Hasselbach  
Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Core knowledge in clinical pharmacology and therapeutics; facts that are necessary to make rational and optimal therapeutic plans in an ambulatory, primary care setting. May be repeated twice for credit.

#### 358C. Pharmacology

(2) I, II, III, IV. Emblen, Hasselbach  
Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Pharmacologic considerations and treatments for various diseases including, but not limited to, the following: Cardiac, Hematology, mood disorders, substance abuse, movement disorders, HIV, TB, drug interactions, toxicology, and sleep disorders. May be repeated twice for credit.

#### 361. Family Theory and Assessment

(1) II. Trolinger, Morris  
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 twice for credit.

#### 367A. Family Practice and Community Health for FNP/PA Students

(2) I. Barakzai  
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 twice for credit.

#### 367B. Family Practice and Community Health for FNP/PA Students

(1) III. Barakzai  
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 twice for credit.

#### 367C. Family Practice and Community Health for FNP/PA Students

(1) I. Barakzai  
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 twice for credit.



**368A. Behavioral Science for FNP/PA Students** (2) I. Stewart, Star

Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Principles of effective communication in therapeutic provider-patient relationship. Students will develop history-taking techniques that foster empathy and respect. Biopsychosocial model of health care discussed; lecture corresponds to small group application. May be repeated twice for credit.

**368B. Behavioral Science for FNP/PA Students** (2) I. Stewart, Star

Lecture—2 hours. Prerequisite: registered student in the FNP/PA Program. Multicultural perspective to educating patients about healthy lifestyle choices and changing addictive behaviors. Compliance barriers are explored. Encourages students to learn about traditional health beliefs and healing practices of several California cultures. May be repeated twice for credit.

**368C. Behavioral Science for FNP/PA Students** (2) I, II, III, IV. Stewart, Star

Lecture—2 hours. Prerequisite: registered student in the FNP/PA Program. Basic principles of crisis assessment and management for the treatment of patients of all age groups in the primary care setting who have experienced interpersonal violence, abuse or common mental health problems (such as anxiety, depression and panic disorder). May be repeated twice for credit.

**368D. Behavioral Science for FNP/PA Students** (1) I, II, III, IV. Stewart, Star

Lecture—1 hour. 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 twice for credit.

**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) I, II, III, IV. Trolinger, Stewart 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 twice for credit. (P/NP grading only.)

**372A. Professional Development for the FNP/PA Student** (1) I, II, III, IV. Hoody, Hasselbach

Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Roles of the family nurse practitioner (FNP) and physician assistant (PA), history of the professions and impact of the FNP and PA on health care system. Development of skills for critically reviewing medical literature. May be repeated twice for credit. (Deferred grading only, pending completion of course.)

**372B. Professional Development for the FNP/PA Student** (1) I, II, III, IV. DeAmicis, Hasselbach

Lecture/discussion—1 hour. Prerequisite: course 372A. Roles of the family nurse practitioner (FNP) and physician assistant (PA), including legal and regulatory issues affecting practice licensing requirements and elements of negotiating a job. Critical evaluation of the medical literature. Emphasis on implementing a new role. (Deferred grading only, pending completion of course.)

**399. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. Davidson

Prerequisite: consent of instructor. Flexibility to develop and pursue research and clinical interests to enhance education in Family Practice. (P/NP grading only.)

**Professional Courses****400A-400B-400C. Introduction to Patient Evaluation** (2-2-2) I, II, III. Callahan, Day

Lecture/discussion—18 hours total; clinical activity—6 hours total; conference or laboratory—4-8 hours

total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Using a problem-based format and simulated patients each student will practice dealing with communication problems and learn basic physical examination skills through small group interactions. A continuity preceptorship and introduction to emergency medicine will also be offered. (Deferred grading only, pending completion of sequence.)

**401. Preceptorship in Family Practice** (1-9) I, II, III, IV. Morgan

Preceptorship—part time (one 4-hour day per week; 10 weeks) or full-time (40-hour week per 1.5 units; 4 to 6 weeks). Prerequisite: medical students with consent of instructor. Student preceptorship in family physician's office as an introduction to clinical medicine.

**407. Davis Community Clinic** (2) I, II, III, IV. Tanji

Clinical activity—5-6 hours. Prerequisite: second-year medical student in good academic standing. Students learn to diagnose and treat common medical problems as seen at a community clinic, under the direct supervision of a physician. (S/U grading only.)

**421. Understanding the Healthcare System of the U.S.A.** (1) I. Chapman

Seminar—2 hours (5 weeks). Prerequisite: medical student in good standing, graduate student or undergraduate with consent of instructor. Seminar series provides insight into the present structure of the health care system of the United States, including history development, health care economics, managed care, and the future of medical care delivery. (S/U grading only.)

**430. Primary Care Plus Clerkship** (12) I, II, III, IV. Morgan, Day

Clinical activity—45 hours; lecture/discussion—2 hours; workshop—2 hours. Prerequisite: completion of first-year and second-year curriculum for the M.D. degree. A required eight-week primary care clerkship for third-year medical students. The clerkship will be a four-week primary care experience with an additional four weeks in Ophthalmology, Otolaryngology, Orthopaedics and Urology clinics (each providing a primary care focus).

**\*433. Primary Care Plus Continuum Clerkship** (6) I, II, III, IV. Morgan

Clinical activity—45 hours (4 weeks). Prerequisite: completion of all required course work of the first-year and second-year medical curriculum. Four week experience in primary care or in Ophthalmology, Otolaryngology, Orthopaedics and Urology clinics (each providing a primary care focus).

**434. Primary Care Clinics** (1-12) I, II, III, IV. Arevalo, Day

Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Prerequisite: 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. (S/U grading only.)

**445. Sports Medicine from a Primary Care Perspective** (6) I, II, III, IV. Tanji

Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Students spend full time in outpatient clinic settings in family practice, orthopaedic surgery, physical education, internal medicine, and a community private practice. Students learn principles and practice of sports medicine from a primary care perspective.

**462. Family Practice Preceptorship** (3-18) I, II, III, IV. Morgan

Clinical activity—full time. Prerequisite: completion of third year of medical school or medical student with consent of instructor. Preceptorships with primary care physicians in a variety of settings. Involvement in direct patient care and daily activities under supervision of physician-preceptor.

**463. Selected Readings in Family Practice** (1-9) I, II, III, IV. The Staff

Discussion—3-27 hours. Prerequisite: medical student in good academic standing. Increase under-

standing of family practice through assigned reading and thorough discussion with faculty member.

**468. Family Practice in a Foreign Culture** (6-18) I, II, III, IV. Davidson

Clinical activity. Prerequisite: completion of third year in medical school. Visit a family practitioner in a foreign country (arranged in advance by Department), accompany and participate in clinic activities of preceptor and analyze and report characteristics of the practice.

**469. Family Practice Clerkship** (3-18) I, II, III, IV. Morgan

Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor (third-year students may elect to enroll for second half of spring quarter). Involvement in comprehensive primary medical care of patients in a family setting and observe the team approach to health care.

**480. Insights in Family Practice** (1-3) I, II, III, IV. The Staff

Clinical activity—3 to 9 hours; required readings. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to family practice in outpatient clinical setting. Three to nine hours per week spent with a community physician preceptor who is a member of the clinical faculty. (S/U grading only.)

**498. Directed Group Study in Family Practice** (1-9) I, II, III, IV. The Staff

Discussion—3-27 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected innovative health care programs. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff

Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (S/U grading only.)

**Human Physiology (HPH)****Upper Division Courses****192. Internship in Human Physiology** (1-12) I, II, III, IV. The Staff (Cala in charge)

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) I, II, III, IV. The Staff (Cala in charge)

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) I, II, III, IV. The Staff (Cala in charge)

Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

**Graduate Courses****200. Human Physiology** (6) II. Cala, Carlsen, and staff

Lecture—48 hours total; discussion—12 hours total. Prerequisite: graduate standing and consent of instructor. General cellular and organ system physiology, including neural, cardiovascular, respiratory, gastrointestinal and urinary systems in the human. Lectures concurrent with course 400; research/discussion and laboratory/demonstration sessions, and examinations separate.

**\*210. Advanced General Physiology** (3) III. Cala and staff

Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in alternate years.

**\*250. Circulatory Transport and Fluid Exchange** (3) I. Curry and staff

Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112, 113 and 114, or courses 400, 403 and 418, or the equivalent; or consent of instructor. Lectures, assigned reading and discussion of principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in alternate years.

**285. Peripheral Circulation** (3) III.

Gray/O'Donnell

Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111A, 113; or course 200 and consent of instructor. Lectures and critical analysis of papers on peripheral vascular function, including: structure/function and pressure/flow relationships, innervation, receptor pharmacology, endothelial and smooth muscle interactions, signal transduction, ion transport, permeability, paracrine mediators and disease mechanisms. Offered in alternate years.

**298. Group Study** (1-5) I, II, III, IV. The Staff (Cala in charge)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

**299. Research** (1-12) I, II, III, IV. The Staff (Cala in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Courses****400. Human Physiology** (8) II. Carlsen, O'Donnell and staff

Lecture—6 hours; laboratory—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of cardiovascular, respiratory, gastrointestinal and urinary systems.

**403. Neurobiology** (5) III. Vijayan, Carlsen, Watson

Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Cell Biology and Human Anatomy 403.)

**418. Mammalian Endocrinology and Homeostasis** (4.5) III. Turgeon and staff

Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

**497T. Tutoring in Human Physiology** (1-5) I, II, III, IV. Cala

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. (S/U grading only.)

**498. Directed Reading and Group Study** (1-4) I, II, III, IV. Cala and staff

Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.)

**499. Research** (1-6) I, II, III, IV. Curry and staff

Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.)

**Internal Medicine (IMD)****Lower Division Courses****92. Internship** (1-4) I, II, III, IV. Last

Internship—3-12 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship in internal medicine and related fields. (P/NP grading only.)

**98. Directed Group Study** (1-2) I, II, III, IV. Last

Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)

**99. Undergraduate Research in Medicine:**

**Molecular and Cell Biology** (1-3) I, II, III, IV. Last  
Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****192. Internship in Internal Medicine** (1-12) I, II, III, IV. The Staff

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) I, II, III, IV. Kumagai

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.)

**198. Directed Group Study** (1-2) I, II, III, IV. Last

Seminar—1-2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff

(Chairperson in charge)  
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**Professional Courses****401A-401B-401C. Physical Diagnosis**

**Practicum** (1-3-3) IV-1-II. Bonekat

Fieldwork—2 hours; lecture/discussion—1 hour; practice—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides second-year students with an overall framework for performance of a history and physical exam and with identification of abnormal physical findings. (Deferred grading only, pending completion of sequence.)

**419. Introduction to Clinical Nutrition** (3) III.

Halsted, Rucker and staff

Lecture—5 hours; lecture/discussion—1.5 hours; laboratory/discussion—0.5 hours (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion/case study. (Same course as Biological Chemistry 419.)

**420A. Hematology** (4) I. Powell

Lecture—4 hours (for five weeks); laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Topics include normal hematopoiesis and basic disorders of blood cells, transfusion therapy, immunoglobulin disorders, and hemostasis. Laboratory exercises cover normal and abnormal blood cells and the interpretation of common laboratory tests and are staffed by clinical hematologists.

**420B. Gastrointestinal System** (3.5) III. Lee

Lecture/discussion—36 hours (over a 4-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgements can be developed. Emphasis on

pathophysiologic basis of gastroenterological and hepatic disorders, with case discussions and symposia presented to exemplify basic principles.

**420C. Respiratory System** (4) II. Louie

Lecture—38 hours; discussion—10 hours (48 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Lectures, demonstrations and small group case discussions of respiratory pathophysiology. Includes review of certain clinical aspects of respiratory anatomy, physiology and pathology; introduction to diagnostic procedures; and description of the major respiratory diseases.

**420D. Cardiovascular System** (3.5) II. Laslett

and staff

Lecture—28 hours; discussion—8 hours (36 hours total). Prerequisite: medical student and approval by Committee on Student Evaluation and Promotion; or graduate student and Animal Physiology 113, Human Physiology 200, or the equivalent, and consent of instructor. Introduction to principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system, including ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Lectures and small group discussions are employed.

**420E. Nephrology** (2.5) III. Kaysen

Lecture—4 hours; laboratory—2 hours (over a 6-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamental aspects of (a) disorders of body water, electrolytes and acid/base balance; (b) major categories and mechanisms of parenchymal renal diseases; (c) urinary tract infections.

**420F. Metabolic Regulatory System** (3.5) III.

Soeldner

Lecture—4 hours; discussion—2 hours (over 8-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis, and elementary management of patients with endocrinological disorders can be rationalized.

**430. Medicine Clerkship** (12) I, II, III, IV.

Lawrence

Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Clerkship is divided into two four-week blocks, one each at UCDCM and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. Ongoing patient write-ups, rounds, conferences are required.

**433. Internal Medicine Continuum Clerkship** (6) I, II, III, IV. Lawrence

Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first- and second-year medical curriculum. Four-week internal medicine clerkship at either UCDCM or Kaiser Hospitals. Direct patient care situations under the guidance of faculty. Ongoing patient write-ups, rounds, conferences are required.

**459. Oncology: Research and Treatment of Cancer** (2) I. DeGregorio

Lecture/discussion—2 hours. Prerequisite: second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer. Emphasis on epidemiology, molecular biology, and pharmacology. (S/U grading only.)

**460. Correctional Health Care Clerkship** (1-4) I, II, III, IV. Silva

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.

**461. Problems in Internal Medicine** (6 or 9) I, II, III, IV. Laughlin

Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school;

consent of instructor. Study of inpatients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, mornings with instructor, Monday through Friday; afternoons patient assignments. Teaching conferences and combined radiology-pathology medicine seminars. Weekly allied specialty conference.

**462. Externship in Medicine** (1-21) I, II, III, IV. Fitzgerald and staff

Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician on medical ward under direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. Limited enrollment.

**463. Acting Internship in Medicine Intensive Care Unit (MICU)** (9) I, II, III, IV. Albertson

Clinical activity—full time. Prerequisite: completion of third year in medical school; consent of Director of MICU. At UCDCM, 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 third night. Limited enrollment.

**494. Practicum in Community Health Clinics** (1-3) I, II, III. Kumagai

Clinical activity—5-40 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.

**498. Group Study in Internal Medicine** (1-18) I, II, III, IV. The Staff (Meyers in charge)

Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDCM or off campus by specific arrangement. (S/U grading only.)

## Internal Medicine—Cardiology (CAR)

### Upper Division Courses

**192. Internship in Cardiology** (1-12) I, II, III, IV. Longhurst and staff

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) I, II, III, IV. The Staff

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) III. Kaufman

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.)

**299. Cardiology Research** (2-3.5) I, II, III, IV. Bonham, Longhurst

Prerequisite: consent of instructor. Research or special studies. (S/U grading only.)

### Professional Courses

**401. Clinical Cardiology Clerkship: Kaiser** (3-18) I, II, III, IV. The Staff

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.

**460. Cardiology Clinical Clerkship** (3-18) I, II, III, IV. The Staff

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.

**461. Management of Coronary Artery Disease: Coronary Care Unit** (3-18) I, II, III, IV. The Staff

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.

**464. Preventive Cardiology** (3-6) I, II, III, IV. Amsterdam

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.

**480. Insights in Cardiology** (1-3) I, II, III, IV. The Staff

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. (S/U grading only.)

**498. Special Group Study: EKG Unit** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

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. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff Prerequisite: approval by Division of Cardiology. (S/U grading only.)

## Internal Medicine—Clinical Nutrition and Metabolism (NCM)

### Upper Division Course

**192. Internship in Clinical Nutrition** (1-12) I, II, III, IV. Halsted and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

### Graduate Course

**290C. Clinical Nutrition Research Conference** (1) I, II, III. Halsted, Davis

Seminar—1 hour. Weekly seminar presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (S/U grading only.)

### Professional Courses

**461. Nutrition Clinical Clerkship** (3-18) I, II, III, IV. Halsted and staff

Lecture—2 hours; clinical activity—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems in under-nutrition due to various illnesses.

**480. Insights in Clinical Nutrition** (1-3) I, II, III, IV. Halsted and staff

Clinical activity—3-9 hours. Prerequisite: student in good standing; consent of instructor. Student will attend weekly clinical nutrition consult rounds (four evenings) and/or Nutrition Clinic (one day). Introduction to diagnosis and treatment of common nutritional problems. (S/U grading only.)

**499. Research in Nutrition** (9-18) I, II, III, IV. Halsted, Davis

Prerequisite: medical student in good standing; consent of instructor. Participation in ongoing clinical or basic nutrition research. Student may devise own project depending upon time commitments.

## Internal Medicine—Emergency Medicine (EMR)

### Lower Division Course

**99. Independent Study of Emergency Medicine for Undergraduates**

(1-5) I, II, III, IV. Sakles  
Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**192. Internship in Emergency Medicine** (1-12) I, II, III, IV. Sakles and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in emergency medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates in Emergency Medicine** (1-5) I, II, III, IV. Sakles

Independent study—3-15 hours. Prerequisite: advanced undergraduate standing and/or consent of instructor. Participate in research projects relating to Emergency Medicine. (P/NP grading only.)

### Professional Courses

**401. Preceptorship in Emergency Medicine** (1-4) I, II, III, IV. Sakles

Clinical activity—6 hours; tutorial—2 hours. Prerequisite: consent of instructor. 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. (S/U grading only.)

**430. Introduction to Medical Toxicology** (3) I, II, III, IV. The Staff

Independent study—24 hours; lecture/discussion—4 hours; fieldwork—12 hours. 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<sup>®</sup> computer database. Additional readings from medical literature required.

**440. Emergency Medicine Required Clerkship** (6) I, II, III, IV. Sakles

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.



**450. Ambulatory Care Clerkship** (3-6) I-II-III-IV. Sakles

Clinical activity—full time (2-4 weeks). Prerequisite: satisfactory completion of Medicine, Surgery, and Emergency Clerkships. 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.)

**465. Acting Internship in Emergency Medicine** (6) I, II, III, IV. Sakles

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.

**499. Research** (2-18) I, II, III, IV. Kuppermann 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. (S/U grading only.)

**Internal Medicine—Endocrinology and Metabolism (ENM)****Upper Division Course**

**192. Internship in Endocrinology** (1-12) I, II, III, IV. Prescott and staff  
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) I, II, III, IV. The Staff (Prescott in charge)  
Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

**Professional Courses**

**460. Endocrinology Clinical Clerkship** (3-18) I, II, III, IV. Prescott and staff  
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.

**480. Insights in Endocrinology** (1-3) I, II, III, IV. Prescott and staff  
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. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff (Prescott in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**Internal Medicine—Gastroenterology (GAS)****Upper Division Course**

**192. Internship in Gastroenterology** (1-12) I, II, III, IV. Leung and staff  
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) I, II, III, IV. Pimstone  
Research in gastroenterology. (S/U grading only.)

**Professional Courses**

**460. Clinical Clerkship** (3-18) I, II, III, IV. Leung and staff  
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.

**480. Insights in Gastroenterology** (1-3) I, II, III, IV. Leung, Hsu  
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. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. Leung, Pimstone, Prindiville, Lee, Hsu, Lam  
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. (S/U grading only.)

**Internal Medicine—General Medicine (GMD)****Upper Division Course**

**192. Internship in General Medicine** (1-12) I, II, III, IV. J. Robbins and staff  
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.)

**Professional Courses**

**460. General Medicine Consults** (1-18) I, II, III, IV. The Staff (Division Chief in charge)  
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.

**470. Health Care Ethics** (3-9) I, II, III, IV.  
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. (S/U grading only.)

**480. Insights in General Medicine** (1-3) I, II, III, IV. Robbins  
Clinical activity—one to nine 4-hour sessions; rounds—one to nine 2- to 4-hour sessions. Prerequisite: student in good academic standing and consent of instructor. Student will observe work-up, diagnostic evaluation and management of common general internal medicine problems in ambulatory and inpatient settings; be supervised by attending physician while attending General Medicine Clinic and/or Consult Rounds; and make brief presentations to consult service. (S/U grading only.)

**485. Introduction to Health Care Ethics** (1) I. Loewy  
Lecture—10 weeks. Prerequisite: medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (S/U grading only.)

**499. General Medicine Research** (1-18) I, II, III, IV. The Staff  
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.

**Internal Medicine—Hematology-Oncology (HON)****Upper Division Course**

**199. Research in Hematology-Oncology** (1-5) I, II, III, IV. Powell and staff  
Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

**Graduate Courses**

**298. Topics in Hematology** (1-4) I, II, III, IV. Meyers and staff  
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) I, II, III, IV. Meyers and staff  
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

**Professional Courses**

**460. Hematology-Oncology Acting Internship** (6-18) I, II, III, IV. Meyers and staff  
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.

**461. Hematology-Oncology Consult Clerkship** (6-12) I, II, III, IV. Meyers and staff  
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.

**462. Hematology-Oncology Ambulatory Clerkship** (6-18) I, II, III, IV. Meyers and staff  
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.

**490. Practicum in Care for the Terminally III** (3-6) I, II, III, IV. Meyers and staff  
Clinical activity—full time (2-4 weeks); three 4-hour seminars included. Prerequisite: fourth-year medical student and an interview with Program Medical Director. 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. Fulfills the Ambulatory Care requirement.

**499. Research** (1-12) I, II, III, IV. Meyers and staff  
Prerequisite: consent of instructor. (S/U grading only.)

## Internal Medicine—Infectious Diseases (IDI)

### Upper Division Courses

#### 141. Infectious Diseases of Humans (1) I.

Dandekar

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.)

#### 192. Research Internship in Internal Medicine

(1-12) I, II, III, IV. Lawrence and staff

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) I, II, III, IV.

The Staff (Lawrence in charge)

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

#### 280. Molecular Pathobiology for Diagnosis and Therapy of Human and Animal Diseases (3) III.

Dandekar

Lecture—3 hours. Prerequisite: graduate standing. Presentation of molecular pathobiology of human and animal viruses. Emphasis on molecular diagnostics at cellular/tissue level, and therapy including vaccines and gene transfer using recombinant DNA technology. Offered in alternate years.

#### 299. Research in Infectious Diseases (1-12) I, II, III, IV.

The Staff (Lawrence in charge)

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 (2) I, II, III, IV.

Flynn

Clinical activity—30 hours; discussion—10 hours. Prerequisite: first- and second-year medical students in good academic standing and consent of 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 life styles. May be repeated for credit. (S/U grading only.)

#### 450. Clinical and Social Care of the Injection Drug User (2) I, II, III, IV.

Flynn

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 12 units. (S/U grading only.)

#### 460. Infectious Diseases Clinical Clerkship

(3-6) I, II, III, IV. Lawrence

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.

#### 499. Research Topics in Infectious Disease

(2-12) I, II, III, IV. The Staff (Lawrence in charge)

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. (S/U grading only.)

## Internal Medicine—Nephrology (NEP)

### Upper Division Course

#### 192. Internship in Nephrology (1-12) I, II, III, IV.

Kaysen and staff

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.)

### Professional Courses

#### 460. Nephrology and Fluid Balance (6-12) I, II, III, IV.

Kaysen and staff

Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. Limited enrollment.

#### 499. Research in Nephrology (3-18) I, II, III, IV.

Kaysen

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. (S/U grading only.)

## Internal Medicine—Pulmonary Medicine (PUL)

### Upper Division Course

#### 192. Internship in Pulmonary Medicine (1-12) I, II, III, IV.

Albertson and staff

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 Courses

#### 210. Grant and Scientific Paper Writing (1) I, II, III, IV.

Last

Discussion—2 hours. Basics of scientific writing for grants and papers. Each student will prepare a grant or paper for critique and tutorial feedback.

#### 299. Pulmonary Disease Research

(1-12) I, II, III, IV. Cross

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.)

### Professional Courses

#### \*460. Pulmonary and Critical Care Medicine

Clinical Clerkship (6-18) I, II, III, IV. Albertson

and staff

Clinical activity—full time (4-12 weeks). Prerequisite: Medical Sciences 431. At UCD 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.

#### 462. Pulmonary Clinical Clerkship (3-12) I, II, III, IV.

Bonekat

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.

#### 480. Pulmonary-Critical Care Medicine Insights

(1-3) I, II, III, IV. Albertson

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. (S/U grading only.)

#### 499. Research (1-12) I, II, III, IV.

The Staff (Cross in charge)

Prerequisite: consent of instructor. (S/U grading only.)

## Internal Medicine—Rheumatology-Allergy (RAL)

### Lower Division Course

#### 99. Directed Research in Immunology (1-5) I, II, III, IV.

Gershwin

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.)

### Upper Division Courses

#### 192. Internship in Rheumatology-Allergy (1-12)

I, II, III, IV. Gershwin and staff

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) I, II, III, IV.

Gershwin

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.)

### Graduate Courses

#### \*281. Clinical Immunology and Immunopathology (4) III.

Gershwin, Leung

Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in alternate years.

#### 298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV.

Gershwin

Laboratory. Prerequisite: consent of instructor. Library and/or laboratory work as required. (S/U grading only.)

#### 299. Research in Autoimmune Disease (1-12) I, II, III, IV.

Gershwin

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.)

### Professional Courses

#### 460. Rheumatology Clinical Clerkship (1-18) I, II, III, IV.

Leek and staff

Clinical activity (inpatient-outpatient service)—full time. 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.

#### 461. Allergy Clinical Clerkship (3-18) I, II, III, IV.

Teuber and staff

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.

**480. Insights in Rheumatology** (1-3) I, II, III, IV. Leek

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. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff (Gershwin in charge)

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. (S/U grading only.)

## Medical Microbiology (MMI)

### Upper Division Courses

**107. Chemical and Cellular Immunology** (4) II. Scibienski

Lecture—4 hours. Prerequisite: Biological Sciences 101 and 102 or consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (Same course as 407.)

**115. Ecological Parasitology** (3) II. Theis

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.

**116. Parasitology for Wildlife Biologists** (3) III. Theis

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.

**\*130. Medical Mycology** (2) II. Pappagianis

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.)

**192. Internship in Medical Microbiology** (1-12) I, II, III, IV. The Staff (Beaman in charge)

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.)

**198. Group Study in Medical Microbiology** (1-5) I, II, III, IV. The Staff (Beaman in charge)

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) I, II, III, IV. The Staff (Beaman in charge)

Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

### Graduate Courses

**200D. Mechanisms for Microbial Interactions with Hosts** (3) II. Beaman

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.

**209. Current Immunology** (2) I, II, III.

Van de Water

Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. May be repeated for credit. (Same course as 409.) (S/U grading only.)

**\*215. Medical Parasitology** (5) I. Theis

Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate student with consent of instructor. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (Same course as 415.)

**220. Current Concepts in Bacterial Ultrastructure** (2) III. Beaman

Discussion—2 hours; student presentations; term paper. Prerequisite: Microbiology 105 or consent of instructor. Critical evaluation of current literature dealing with all aspects of bacterial ultrastructure. Discussion of selected and assigned reading and formal student presentations of assigned topics.

**298. Group Study in Medical Microbiology and Immunology**

(1-5) I, II, III, IV. The Staff (Beaman in charge) 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) I, II, III. The Staff (Beaman in charge)

Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

### Professional Courses

**407. Chemical and Cellular Immunology** (4) II. Scibienski

Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (S/U grading only.) (Same course as 107.)

**409. Current Immunology** (2) I, II, III.

Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 209.) May be repeated for credit. (S/U grading only.)

**\*415. Medical Parasitology** (5) I. Theis

Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Approved for graduate degree credit. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (Same course as 215.)

**420. Current Concepts in Bacterial Ultrastructure** (2) III. Beaman

Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of instructor. Evaluation of current status of bacterial ultrastructure with an emphasis on host-parasite interactions through discussions and assigned readings. (S/U grading only.)

**\*430. Medical Mycology** (2) II. Pappagianis

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.)

**480A. Medical Immunology** (2.5) III. Scibienski

Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Presents the structure and function of the molecules, cells, and tissues involved in immunity, and their interactions in health and disease.

**480B. Pathogenic Microbiology** (6.5) I.

Scibienski

Lecture—7 hours (for 9 weeks); laboratory—20 hours per quarter. Prerequisite: approval by Committee on Student Evaluation and Promotion. The biology of pathogenic microorganisms with emphasis on their role in human disease.

**497T. Tutoring in Medical Microbiology** (1-5)

I, II, III, IV. Beaman and staff

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. (S/U grading only.)

**498. Group Study in Medical Microbiology and Immunology** (1-5) I, II, III, IV. The Staff (Beaman in charge)

Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff

(Beaman in charge)

Prerequisite: medical students with consent of instructor. (S/U grading only.)

## Medical Pharmacology and Toxicology (PHA)

### Lower Division Courses

**92. Internship in Pharmacology** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

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) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: lower division standing. (P/NP grading only.)

### Upper Division Courses

**100. Survey of Pharmacology** (2) I. Hollinger

Lecture—2 hours. Prerequisite: introductory physiology and biochemistry or consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions; pharmacological aspects of drug dependency and related topics.

**192. Internship in Pharmacology** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

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) I, II, III, IV.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**200A. Advanced General Pharmacology** (3) I.

Hance and staff

Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs.

**200B. Advanced General Pharmacology** (4) II.

Stark and staff

Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human phar-



macology designed for graduate and medical students. The actions, use and toxicity of major classes of drugs. Continuation of course 200A.

**203. Pharmacology of the Nervous System: Stimulants and Anticonvulsants (2) II.** Stark  
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in alternate years.

**\*204. Pharmacology of the Nervous System: Drug Alteration of Behavior (1-3) II.** K.F. Killam  
Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacologic agents, hallucinogens, antidepressants. Offered in alternate years.

**206. Pharmacokinetics (2) I.** Henderson  
Lecture—2 hours. Prerequisite: courses 200A, 200B. Physicochemical and physiological factors affecting absorption, distribution, metabolism and excretion of drugs. Mathematical and graphical methods for determining pharmacokinetic parameters. Calculation of dose regimens. Offered in alternate years.

**206L. Pharmacokinetics Laboratory (2) I.** Henderson  
Laboratory—6 hours. Prerequisite: course 206 (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject matter sequence of course 206. Offered in alternate years.

**297T. Tutoring in Pharmacology (1-3) I, II, III.** The Staff (Chairperson in charge)  
Tutorial—3-9 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology. (S/U grading only.)

**298. Group Study (1-5) I, II, III, IV.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.

**299. Research (1-12) I, II, III, IV.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**400A. Principles of Pharmacology (2.5) I.** Hance and staff  
Lecture—6 hours (for 4 weeks); discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs.

**400B. Principles of Pharmacology (6) II.** Stark and staff  
Lecture—38 hours total; discussion—28 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. The actions, uses and toxicities of the major classes of drugs. Continuation of 400A.

**490. Seminar in Pharmacology for Medical Students (1) I, II, III, IV.** The Staff  
Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students.

**497T. Tutoring in Pharmacology (1-5) I, II, III, IV.** The Staff (Chairperson in charge)  
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. (S/U grading only.)

**498. Special Study for Medical Students (1-5) I, II, III, IV.** The Staff (Chairperson in charge)  
Lecture, directed reading, and/or discussion groups—3-15 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (S/U grading only.)

**499. Directed Research for Medical Students (1-12) I, II, III, IV.** The Staff (Chairperson in charge)  
Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (S/U grading only.)

## Neurology (NEU)

### Upper Division Course

**199. Individual Special Study and Research (1-4) I, II, III, IV.** The Staff (Chairperson in charge)  
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

**201. Human Behavioral Neurobiology (2) I.** Robertson  
Lecture/discussion—2 hours. Prerequisite: Cell Biology and Human Anatomy 203; Psychology 108 or 136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and cognitive parameters. Evaluation of these parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuroimaging tests.

**202. Visuomotor Neurobiology (2) III.** Rafal  
Seminar—2 hours. Prerequisite: course 201, Cell Biology and Human Anatomy 203. An overview of neural mechanisms of visually guided behavior in humans will examine the integration of visual attention and eye movements. Performance of normal humans and neurologic patients in reflexive orienting, visual search, reading and reaching will be considered. Offered in alternate years.

**290. Seminar in Selected Topics (1) I, II, III, IV.** Gorin  
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (S/U grading only.)

**298. Group Study (1-5) I, II, III, IV.** The Staff (Seyal in charge)  
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) I, II, III, IV.** Staff (Richman in charge)  
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 (4) II.** Remler and staff  
Lecture—6 hours; laboratory/discussion—5 hours (for five weeks total). Prerequisite: medical student with approval by Committee on Student Evaluation and Promotion. Lectures and case discussions of 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 will be discussed.

**450. Clinical Neurology Clerkship (3-6) I, II, III, IV.** Richman and staff  
Clinical activity—full time (2-4 weeks at UCDMC). Prerequisite: fourth-year medical student. Essentials of a detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

**451. Clinical Neurology Clerkship (3-6) I, II, III, IV.** Remler and staff  
Clinical activity—full time (2-4 weeks at Highland General Hospital, Oakland). Prerequisite: fourth-year medical student. Essentials of detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

**452. Advanced Clinical Neurology (6) I, II, III, IV.** Richman and staff  
Clinical activity—full time (4 weeks). Prerequisite: completion of four-week Neurology selective and con-

sent 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.

**453. Advanced Clinical Neurology (6) I, II, III, IV.** Remler and staff  
Clinical activity—full time (4 weeks at Highland General Hospital, Oakland). 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 the nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

**454. Electroencephalography and Evoked Potentials (3-18) I, II, III, IV.** Gabor, Seyal  
Clinical activity—full time (2-12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electroencephalographic diagnosis including technical basis of electroencephalography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

**455. Child Neurology (6) I, II, III, IV.** Gospe  
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.

**456. Cortical Neurology (3-18) I, II, III, IV.** Remler, Knight  
Clinical neurological research—full time (12 weeks at Highland General Hospital, Oakland). Prerequisite: course 451 or the equivalent; consent of instructor. Student will pursue a small project in clinical neurologic research on higher cortical functions. The focus is on scientific analysis of behavior in disease states. Study may be arranged for from two weeks to twelve weeks, with units corresponding to length of course.

**457. Special Topics in Neurology (3-18) I, II, III, IV.** The Staff  
Clinical activity—full time (2 to 12 weeks). Prerequisite: course 450, 451 or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise and interest in elected field. Students may elect tutorial clinical experience with member of staff.

**458. Introduction to Cognitive and Communication Disorders (3) I.** Dronkers  
Lecture—3 hours; observations, individual projects. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Includes a survey of disorders subsequent to brain damage; management by neurology, neuropsychology, and speech pathology; and current research on appraisal, diagnosis, and treatment. (S/U grading only.)

**459. Independent Study in Neurogenic Communication Disorders (1-3) I, II, III, IV.** Dronkers  
Conference, observation and data collection—3-9 hours. Prerequisite: consent of instructor. Independent study of neurogenic communication disorders—aphasia, dementia, apraxia of speech, dysarthria. Designed for individual interest and includes discussion, directed reading, research design, data collection, and preparation of results. (S/U grading only.)

**464. Clinical Neurology (3-18) IV, I, II, III.** The Staff (Richman in charge)  
Clinical activity—full time (minimum of one-half quarter). Prerequisite: fourth-year medical student or third-year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neurology to be arranged at another institution with accredited residency programs in neurology under proper supervision.

**468. Special Clinical Elective in Neurology**

(6-18) I, II, III, IV. The Staff  
Clinical activity—full time (4 to 12 weeks). Prerequisite: fourth-year medical student or third-year medical student with clerkship in medicine and pediatrics. Emphasis will be on mastering the neurologic examination and on introduction to neurologic evaluation, diagnosis and therapy.

**480. Insights in Neurology (1-3) I, II, III, IV.**

The Staff  
Discussion—3 hours; clinical activity—3 to 9 hours. Prerequisite: student in good academic standing; consent of instructor. Attendance at neurology grand rounds and regular rounds following. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. The Staff**

(Richman in charge)  
Laboratory—2-24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. (S/U grading only for graduate and medical students.)

**Neurosurgery (NSU)****Upper Division Course****199. Special Study in Neurosurgery for**

**Advanced Undergraduates (1-5) I, II, III, IV.** The Staff (Chairperson in charge)

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) I, II, III, IV.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge)

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.

**455. Clinical Pediatric Neurosurgery (6) I, II, III, IV.** Pang

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.

**460. Clinical Neurosurgery (6-18) I, II, III, IV.**

The Staff (Chairperson in charge)  
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.

**464. Externship (6-18) I, II, III, IV.** The Staff

(Chairperson in charge)  
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.

**470. Advanced Clinical Neurosurgery (6-18) I,**

**II, III, IV.** The Staff (Chairperson in charge)  
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic stand-

ing. 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.

**480. Insights in Neurosurgery (1-3) I, II, III, IV.**

The Staff  
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. (S/U grading only.)

**499. Neurosurgery Research (1-18) I, II, III, IV.**

The Staff (Chairperson in charge)  
Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

**Obstetrics and Gynecology (OBG)****Upper Division Courses**

**190. Seminar in Early Mammalian Development (1) I, II, III.** Wiley

Seminar—1 hour; short paper. Prerequisite: Zoology 100 or the equivalent. Each student will present paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

**198. Directed Group Study (1-5) I, II, III, IV.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV.** The Staff

(Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**290. Current Topics in Research (1) I, II, III, IV.**

The Staff  
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (S/U grading only.)

**291. Seminar in Early Mammalian Development (1) I, II, III, IV.** Wiley

Seminar—1 hour. Each student will be asked to present a paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

**298. Group Study (1-5) I, II, III, IV.** Overstreet  
Prerequisite: graduate standing; consent of instructor.

**299. Research (1-12) I, II, III, IV.** Overstreet  
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

**Professional Courses**

**420. Human Reproduction (2) IV.** Wiley  
Lecture—4 hours (for 6 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Course serves as a bridge between the basic science aspects and clinical aspects of human reproduction. Provides clinically relevant extensions of material introduced in the sciences basic to medicine in anatomy, reproductive physiology and molecular biology/genetics.

**430. Obstetrics and Gynecology Clerkship (12)**

**I, II, III, IV.** Birdsong  
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Obstetric, 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.

**433. Obstetrics and Gynecology Continuum**

**Clerkship (6) I, II, III, IV.** Birdsong  
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Obstetric, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC or affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing.

**465. Elective Clerkship (4-18) I, II, III, IV.**

Birdsong  
Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical student; course 430 or the equivalent; consent of instructor. Active participation in inpatient and outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

**470. Acting Internship in Obstetrics and**

**Gynecology (6-8) I, II, III, IV.** Leiserowitz  
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed course 430; consent of instructor. Student will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

**471. Ambulatory Gynecology and Obstetrics**

**(6-8) I, II, III, IV.** The Staff  
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.

**499. Research in Obstetrics and Gynecology**

**(4-18) I, II, III, IV.** The Staff  
Prerequisite: medical student with consent of instructor. Student will pursue a research problem of her/his own choosing, selected with help of the faculty. Integration with ongoing faculty research projects recommended. (S/U grading only.)

**Ophthalmology (OPT)****Upper Division Courses**

**192. Research Internship (1-12) I, II, III, IV.**

The Staff  
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) I, II, III, IV.** The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Course**

**299. Basic Research in Visual Science (1-12) I,**

**II, III, IV.** The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

**Professional Courses**

**440. Ophthalmology Required Clerkship (3) I,**

**II, III, IV.** J. Brandt  
Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Fundamental knowledge of ophthalmic diagnosis and principles; basic ophthalmic instruments; understanding of treatment for eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

**461. Basic Clinical Ophthalmology** (4.5) I, II, III, IV. J. Brandt  
Clinical activity—to be arranged (2 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an acquaintance with the fundamentals of routine clinical ophthalmology.

**465. Advanced Subspecialty Ophthalmology** (6 or 9) I, II, III, IV. Mannis, Keltner, J. Brandt  
Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). 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. Rotations at UCD Medical Center may be arranged in 6-week units of one service alone, or in combination, as arranged with instructors.

**480. Insights in Ophthalmology** (1-3) I, II, III, IV. J. Brandt and staff  
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in ophthalmology including slide-tape program, patient exposure, and department conferences (i.e., grand rounds and subspecialty conference). (S/U grading only.)

**498. Group Study** (1-3) I, II, III, IV. The Staff (J. Brandt in charge)  
Prerequisite: medical students with consent of instructor. Directed reading and discussion. (S/U grading only.)

**499. Research in Ophthalmology** (1-12) I, II, III, IV. The Staff  
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. (S/U grading only.)

## Orthopaedic Surgery (OSU)

### Lower Division Course

**\*99. Special Studies for Undergraduates** (1-4) I, II, III, IV. The Staff (Martin in charge)  
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

### Upper Division Course

**\*199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Martin in charge)  
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

### Professional Courses

**421. The Musculoskeletal System** (2.5) The Staff  
Lecture—5 hours (for 5 weeks); laboratory/discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. An introduction to the basic and clinical science of orthopaedic surgery and rheumatology.

**428. Ambulatory Orthopaedics** (3-6) I, II, III, IV. Moehring  
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.

**462. Community Preceptorship** (3-6) I, II, III, IV. Moehring  
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.

**464. Acting Internship** (6) I, II, III, IV. Moehring  
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.

**480. Insights in Orthopaedic Surgery** (1-3) I, II, III, IV. Szabo  
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. (S/U grading only.)

**481. History of Medicine for Medical Students** (1.5) I. Benson  
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. (S/U grading only.)

**499. Orthopaedics Research** (1-12) I, II, III, IV. The Staff (Rodrigo in charge)  
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. (S/U grading only.)

## Otolaryngology (OTO)

### Lower Division Courses

**\*192. Internship in Otolaryngology** (1-12) I, II, III, IV. Chairperson in charge  
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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study in Otolaryngology for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)

### Graduate Courses

**290C. Research Conference in Otolaryngology** (1) I, II. The Staff  
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.)

**291. Principles of Speech, Hearing and Equilibrium** (3) II. The Staff  
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.

**298. Group Study** (1-5) I, II, III, IV. The Staff (S/U grading only.)

**299. Individual Study in Otolaryngology for Advanced Graduate Students** (1-12) I, II, III, IV. Brodie and staff  
Prerequisite: advanced graduate student with consent of instructor. (S/U grading only.)

### Professional Courses

**401. Clinical Examinations in Otolaryngology** (1) I, II, III, IV. Kendall  
Lecture—1 hour; laboratory—1 hour; practical—1 hour total. Prerequisite: second-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Obtaining the history, applied anatomy of the regions, and the art of the examination. Head mirror required.

**402. Otolaryngology in Family Practice** (1) I, II, III, IV.  
Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Approved for graduate degree credit. Planned as a refresher course for those already possessing a background of knowledge in the specialty.

**403. Basic Principles of Reconstructive Surgery** (1) II. Donald  
Lecture—four 2-hour sessions; laboratory—one 2-hour session (5 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.

**440. Otolaryngology Required Clerkship** (3) I, II, III, IV. Strong  
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.

**460. Clinical Otolaryngology Elective** (3-18) I, II, III, IV. Strong  
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.

**480. Insights in Otolaryngology** (1-3) I, II, III, IV. Strong  
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Individualized activities (depending upon time available and previous exposure to Ear, Nose and Throat) including observing patient exams, ward rounds and attendance at lectures and grand rounds. (S/U grading only.)

**\*490. Journal Seminar** (1) I, II, III, IV. Donald  
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.

**498. Individual or Group Study** (1-5) I, II, III. The Staff  
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. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff  
Prerequisite: medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. (S/U grading only.)

## Pathology (PMD)

### Upper Division Courses

**192. Internship in Human Pathology** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
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) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: advanced undergraduates and consent of instructor. (P/NP grading only.)

### Graduate Courses

**207. Decision Support Systems** (4) I. Walters  
Lecture/discussion—2 hours; laboratory—2 hours; independent study—2 hours. Prerequisite: consent of instructor. Introduction to decision support systems for medical applications. Knowledge and computer representation, review of existing decision support systems. (S/U grading only.)

**208. Electronic Medical Data Information** (4) I. Huntley  
Lecture/discussion—2 hours; laboratory—2 hours; independent study—3 hours. Prerequisite: consent of instructor. Electronic resources for medical practice. Review of existing resources and development of materials. (S/U grading only.)

**209. Data Acquisition in Medicine and Veterinary Medicine** (4) I. Case  
Lecture/discussion—2 hours; laboratory/discussion—6 hours. Prerequisite: basic proficiency in computer operation. Overview of the nature of medical and veterinary data and the methods for capturing and storing data in electronic formats. Data validation and retrieval considerations.

**210. Introduction to Human Pathology** (4.5) III. C. Miller  
Lecture/discussion—8 hours; laboratory—4 hours (5 weeks). Prerequisite: graduate or upper division students with background in gross and microscopic anatomy, physiology and biochemistry. Lectures, laboratory, and computer-assisted learning. Introduces basic human disease processes. Stresses mastery of pathophysiology and vocabulary. Examining gross and microscopic tissue sections is taught. (Course given second five weeks of spring and taken with first-year medical students enrolled in course 410A.) Course not intended for veterinary or medical students.

**222. Computer-Based Patient Records** (4) II. Estberg  
Lecture/discussion—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Conversion from paper-based to computer-based medical records and the disadvantages, advantages, and barriers to conversion. Storage and representation of medical data to facilitate use and interpretation. Review of current computer-based medical records models and standards in data storage and transmission.

**298. Advanced Group Study** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**404. Forensic Pathology** (2) I, II, III, IV. Ellis  
Laboratory—3-10 hours. Prerequisite: medical student or consent of instructor. Systematic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and medical-legal procedures. Introduction to histopathologic diagnosis, ballistics, and toxicology. (S/U grading only.)

**\*405. Brain Cutting Conference** (1-4) I, II, III, IV. Ellis  
Seminar—1-4 hours. Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed.

**407. Advanced Neuropathology** (1-12) I, II, III, IV. Ellis  
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. (S/U grading only.)

**410A-410B. General/Systemic Pathology** (4.5, 7.5) III-IV. Miller, Jensen  
Lecture—30, 30 hours total; laboratory/discussion—25, 90 hours total; autotutorial—0, 5 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Includes both lecture, laboratories and small group discussions that emphasize an in-depth study of pathophysiologic mechanisms of disease. Gross organ and microscopic study of disease is presented on an organ system basis. (Deferred grading only, pending completion of sequence.)

**464. Anatomic Pathology** (6-12) I, II, III, IV. Gandour-Edwards  
Clinical activity—full time (4-8 weeks). Prerequisite: third- or fourth-year medical student and consent of instructor. Experience in anatomic pathology with emphasis on surgical pathology and applications to clinical practice. Students participate in specimen grossing, frozen sections, microscopic sign-out and conferences. If desired, opportunities in autopsy and cytopathology are available. (S/U grading only.)

**465. Applied Clinical Laboratory Medicine** (6-9) II, III, IV. Kost  
Clinical activity—full time (4-6 weeks). 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.

**497T. Tutoring in Pathology** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
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. (S/U grading only.)

**498. Advanced Group Study** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (S/U grading only.)

**499. Research** (1-18) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: medical student with consent of instructor. Research in experimental, molecular, comparative, and applied pathology. Limited enrollment. (S/U grading only.)

## Pediatrics (PED)

### Upper Division Course

**199. Special Study in Pediatric Research** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
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) I, II, III, IV. The Staff (Chairperson in charge)  
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) I, II, III, IV. Chairperson in charge  
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.

**402. Clinical Experience in Private Practice** (1-18) I, II, III, IV. Chairperson in charge  
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.

**430. Pediatric Clerkship** (12) I, II, III, IV. Hansen  
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. 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.

**\*433. Pediatric Continuum Clerkship** (6) I, II, III, IV. Hansen  
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Four-week clinical clerkship providing opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery/ambulatory or inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing.

**460A. Acting Internship: General Inpatient Pediatric Clerkship** (6-18) I, II, III, IV. Connors  
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.

**460B. Acting Internship: Outpatient Pediatrics** (3-18) I, II, III, IV. The Staff (Chairperson in charge)  
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.

**461. Elective in Hematology/Oncology** (3-18) I, II, III, IV. Ducore  
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 hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

**462. Elective in Pediatric Endocrinology** (3-18) I, II, III, IV. Connors and staff  
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.

**464. Acting Internship in Neonatology** (6-18) I, II, III, IV. Merritt  
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.

**465. Pediatric Specialty Clinic Elective** (3-18) I, II, III, IV. The Staff (Chairperson in charge)  
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.

**466. Elective in Pediatric Cardiology** (3-18) I, II, III, IV. Parrish  
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.

#### 467. Elective in Pulmonary Medicine (3-18)

I, II, III, IV. McDonald, Joad  
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.

#### 468. Elective in Pediatric Nephrology (3-18)

I, II, III, IV. Makker  
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.

#### 469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV. Wenman

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.

#### 470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Gospe

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430, Internal Medicine 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.

#### 471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. The Staff (Chairperson in charge)

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.

#### 476. Acting Internship in Pediatric Intensive Care (6-18) I, II, III, IV. Dimand

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.

#### \*499. Research Topics in Pediatrics (1-18) I, II, III, IV. The Staff (Styne in charge)

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. (S/U grading only.)

## Physical Medicine and Rehabilitation (PMR)

### Upper Division Courses

#### 198. Directed Group Study (1-5) I, II, III, IV.

The Staff (Chairperson in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

### Graduate Course

\*299. Research (1-12) I, II, III, IV. The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

#### 440. Rehabilitation Medicine Clerkship (3) I, II, III, IV. McDonald

Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student; approval by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiological effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

#### 461. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kilmer

Clinical activity—full time. Prerequisite: completion of third year in Medical School; Internal Medicine 430, Surgery 430. Intended for non-UC medical students. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation service.

#### 462. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kilmer

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.

#### 498. Advanced Group Study (1-5) I, II, III, IV. The Staff

Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (S/U grading only.)

#### 499. Research for Medical Students (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (S/U grading only.)

## Plastic Surgery (PSU)

### Professional Courses

#### 460. Clinical Plastic Surgery Elective (1-18) I, II, III, IV. Stevenson

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.

#### \*461. Dentistry for Future Physicians and Surgeons (6-8) I, II, III, IV. Thaller

Discussion/seminar—3 hours; laboratory—2 hours; clinical activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental problems; provide emergency care; have knowledge of where to refer these problems. (S/U grading only.)

## Psychiatry (PSY)

### Upper Division Courses

#### 198. Directed Group Study (1-5) I, II, III, IV.

The Staff (Servis in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Servis in charge)

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

#### \*226. Psychiatric Implications of Legal Intervention (2) I, III. Yarvis

Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedure. Moot court demonstrations.

#### 298. Directed Group Study For Graduate Students (1-5) I, II, III, IV. The Staff (Servis in charge)

Prerequisite: graduate standing and consent of instructor.

#### 299. Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Servis in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

#### 401. Medicine and the Mind: An Introduction to Psychiatry (2) I. Knapp

Lecture/discussion—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychiatry throughout the human life cycle. Includes tutorials tailored to individual student interests which will explore the biological, psychological, social, and cultural factors influencing health and illness. Includes lecture and video presentations as well as group discussion.

#### 402. Human Sexuality (1) VI. Keasey

Lecture—2 hours; discussion—2 hours (4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Normal and variant human sexuality. The focus will be on understanding human sexual function in health and illness. (S/U grading only.)

#### 403. Fundamentals of Clinical Psychiatry (3.5) II. Leamon

Lecture—5 hours; discussion—2 hours. Prerequisite: courses 401 and 402. Teaches principles and techniques of psychiatric interviewing, Mental Status Exam and diagnosis. Covers major child and adult disorders, including substance abuse and dependence. Lectures, patient presentations, AV materials, along with weekly student interviews of psychiatric patients in small group format.

#### 412. Psychiatry Grand Rounds (1) II, III, IV. Cox and staff

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.

#### 413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Cox and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) 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.

#### 414. Consultation-Liaison Clerkship (6-12) I, II, III, IV. Sevis and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents.

#### 415. Substance Abuse: Diagnosis and Treatment (3) I, II, III, IV. Leyba

Clinical activity—20 hours; independent study—15 hours; lecture/discussion—5 hours. Prerequisite:

medical student with consent of instructor. Two-week selective offering supervised contact with patients addicted to alcohol, opioids, cannabis, or psychostimulants. Sites: Travis Air Force Base and regional Methadone and Alcohol Treatment Programs. Pharmacological, psychosocial, "12-step" and behavioral treatments will be demonstrated.

**416. Child Psychiatry Clerkship** (6-12) I, II, III, IV. Harris and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) 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.

**417. Jail Psychiatric Clerkship** (6 or 12) I, II, III, IV. Yarvis and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) 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.

**418. Off-Campus Clinical Experience** (6 or 12) I, II, III, IV. Cox and staff

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.

**420. Acting Internship in Psychiatry** (6-12) I, II, III, IV. Cox and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: course 430 (Psychiatry Core Clerkship) 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.

**422. Readings in Psychiatry** (1-3) I, II, III, IV. Cox and staff

Readings/discussion—3-9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (S/U grading only.)

**430. Psychiatry Clinical Clerkship** (12) I, II, III, IV. Cox

Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Students are assigned to clinical settings; building upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Focus on patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment and intervention.

**433. Psychiatry Continuum Clerkship** (6) I, II, III, IV. The Staff

Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Practice in clinical settings, building upon the skills gained in preclinical years, with an emphasis on diagnostic, therapeutic, and interpersonal skills. Areas of focus: patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, and intervention.

**480. Insights in Psychiatry** (1-3) I, II, III, IV. Cox

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. (S/U grading only.)

**498. Directed Group Study** (1-5) I, II, III, IV. Servis and staff

Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (S/U grading only for graduate or medical students.)

**499. Research** (1-12) I, II, III, IV. Maddock and staff

Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (S/U grading only for graduate or medical students.)

## Radiation Oncology (RON)

### Graduate Course

**299. Independent Study and Research** (1-12) I, II, III, IV. Kubo

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.)

### Professional Courses

**463. Radiation Oncology Clerkship** (3-9) I, II, III, IV. Castro, Ryu, Wilder

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.

**498. Group Study in Therapeutic Radiology** (1-12) I, II, III, IV. The Staff.

Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

**499. Research in Radiobiology** (3-12) I, II, III, IV. Leigh

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. (S/U grading only.)

## Radiology—Diagnostic (RDI)

### Professional Courses

**413. Radiological Diagnosis II (Physics of Diagnostic Radiology)** (5) I. Seibert, Boone

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. (S/U grading only.)

**414. Medical Radiation Biology** (3) III. Bushberg  
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 even numbered years only. (S/U grading only.)

**\*415. Radiopharmacy** (3) III. Vera  
Lecture—3 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical science including radiochemistry; radiopharmaceutical production; theory; applications; mechanisms of localization, radionuclide and radiopharmaceutical drug applications and related regulatory aspects. Offered in alternate years. (S/U grading only.)

**461. Clinical Clerkship in Diagnostic Radiology** (1-18) I, II, III, IV. Greenspan

Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UC Davis Medical Center in film reading sessions and radiological procedures; includes fluoroscopy, vascu-

lar radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and all radiology conferences and seminars. Limited enrollment.

**462. Diagnostic Imaging of Acquired and Congenital Heart Disease** (2) III. Bogren

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. (S/U grading only.)

**498. Group Study in Diagnostic Radiology** (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

**499. Research in Diagnostic Radiology** (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

## Radiology—Nuclear Medicine (RNU)

### Upper Division Courses

**101. Biomedical Radiochemistry** (3) III. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. 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. (Same course as 401.)

**198. Directed Group Study** (1-5) I, II, III, IV. The Staff (S. DeNardo in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Stadlnik in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Graduate Course

**299. Research: Special Study for Graduate Students** (1-12) I, II, III, IV. The Staff (Director in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

**401. Biomedical Radiochemistry** (3) III. The Staff

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. (Same course as 101.)

**411. Radiological Physics I (Physics of Nuclear Medicine)** (5) I. Bushberg, Vera

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. (S/U grading only.)

**463. Clinical Clerkship in Nuclear Medicine** (9 or 18) I, II, III, IV. Shelton

Clinical activity—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor.



Clerkship correlates radioisotopic methods with clinical, pathophysiologic, 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 with preference to students enrolling for 18 units.

**498. Group Study in Nuclear Medicine** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

**499. Research in Nuclear Medicine** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Approved for graduate degree credit. (S/U grading only for medical students.)

## Surgery (SUR)

### Upper Division Courses

**192. Internship in General Surgery** (1-12) I, II, III, IV. The Staff  
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) I, II, III, IV. The Staff  
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III, IV. Wolfe in charge  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

**\*419. Introduction to Clinical Surgery** (1-6) I, II, III, IV. Ward  
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

**430. Surgery Clerkship** (12) I, II, III, IV. Holcroft  
Clinical activity—45 hours. Prerequisite: medical students with approval by Committee on Student Evaluation and Promotion. Eight-week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, Consult, Transplant and Trauma. Clerkship assignments are at UCDCM and Highland. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients.

**433. Surgery Continuum Clerkship** (6) I, II, III, IV. The Staff  
Clinical activity—full time (for 4 weeks). Prerequisite: completion of all required course work of first and second year medical curriculum. Four-week general surgery clerkship which may include GI, Burn, Oncology, Plastics, Vascular, Cardiothoracic, Consult, Transplant and Trauma. Clerkship assignments are at UCDCM and Highland. Daily core material presentations and reading assignments. Student involvement includes workup and care of surgical patients.

**460A. Clinical Surgical Elective** (6-18) I, II, III, IV. Benfield  
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.

**461. Surgery Burn Unit Clerkship** (6 or 9) I, II, III, IV. The Staff  
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical stu-

dent with completion of course 430. Student functions as an extern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

**462. Surgery Trauma Service Clerkship** (6 or 9) I, II, III, IV. Blaisdell and staff  
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.

**463. Surgery Intensive Care Unit** (6 or 9) I, II, III, IV. Holcroft and staff  
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.

**464. General Surgery Clerkship: Kaiser Hospital** (6 or 9) I, II, III, IV. The Staff  
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 with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical, general surgical problems and participate in their care.

**\*466. General Surgery Clerkship: Travis AF Base Hospital** (6 or 9) I, II, III, IV. Kline, Holcroft  
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. The program has a large number of general surgery problems and provides a broad clinical experience in surgery.

**467. Surgical Oncology** (3-9) I, II, III, IV. Goodnight and staff.

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.

**468. Cardiothoracic Surgery Clerkship** (6-9) I, II, III, IV. Benfield  
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.

**469. Trauma Service: East Bay** (6-9) I, II, III, IV. Organ and staff  
Clinical activity—full time. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430 and Internal Medicine 430. Student works as an extern on the Trauma Service at Highland General Hospital (Oakland) participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on and 24 hours off.

**470. General Surgery: East Bay** (6-9) I, II, III, IV. Organ  
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Student will work as an extern on one of the two general surgery services and participate in the pre-operative evaluation, intra-operative management, and post-operative care of surgical patients.

**471. Gastrointestinal Surgery** (3-9) I, II, III, IV. Wolfe

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.

**472. Vascular Surgery** (3-9) I, II, III, IV. Holcroft  
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.

**473. Surgery Intensive Care Unit** (6-9) I, II, III, IV. Organ  
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430 and Internal Medicine 430. Student functions as an extern on the surgical ICU service, participating in the clinical management of critically ill patients in the SICU and participating in ICU procedures with appropriate supervision.

**474. Breast Disease** (6) I, II, III, IV. Goodnight  
Clinical activity—full time (4 weeks). Prerequisite: third-year surgery clerkship, Medical Sciences 430. Students focus on aspects of benign and malignant breast disease working in the surgical oncology clinics, observing needle localization procedures, following patients to the O.R., working with radiologists in mammography, working in hematology-oncology clinics, and with pathologists reviewing histology.

**478. Surgical Preceptorship: Off Campus** (6-18) I, II, III, IV. Holcroft  
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and post-operative care of surgical patients under the supervision of attending staff.

**480. Insights in Surgery** (1-3) I, II, III, IV. The Staff  
Clinical activity—3 to 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. (S/U grading only.)

**494H. Fourth-Year Surgical Honors Program** (18) I, II, III, IV. Holcroft  
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. (S/U grading only.)

**498. Group Study** (1-5) I, II, III, IV.  
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (S/U grading only.)

**499. Laboratory Research** (1-12) I, II, III, IV. Holcroft and staff  
Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (S/U grading only.)

## Urology (URO)

### Upper Division Course

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. deVere White  
Prerequisite: consent of instructor. (P/NP grading only.)

**Professional Courses**

**400. Office Urology** (1) I, II, III, IV. deVere White  
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.

**460. Urology Clinical Clerkship** (5-18) IV, I, II, III. deVere White  
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.

**461. Externship in Urology** (5-18) I, II, III, IV. deVere White  
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.

**499. Research in Urology** (1-12) I, II, III, IV. deVere White  
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 bioprosthesis.

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## Medicine and Epidemiology

(School of Veterinary Medicine)

Gary P. Carlson, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2108 Tupper Hall (530-752-1363)  
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Gary P. Carlson, D.V.M., Ph.D., Professor  
Tim Carpenter, Ph.D., Professor  
Jim Case, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Medicine  
Larry D. Cowgill, D.V.M., Ph.D., Associate Professor  
Nancy E. East, M.S., D.V.M., M.P.V.M., Professor  
Edward Feldman, D.V.M., Professor  
Ian Gardner, D.V.M., M.P.V.M., Ph.D., Associate Professor  
Lisle W. George, D.V.M., Ph.D., Professor  
Ronald P. Hedrick, Ph.D., Professor  
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Gerald V. Ling, D.V.M., Professor  
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Richard W. Nelson, D.V.M., Professor  
Niels C. Pedersen, D.V.M., Ph.D., Professor  
Lyndsay G. Phillips, D.V.M., Associate Professor  
Bradford P. Smith, D.V.M., Professor  
Sharon J. Spier, D.V.M., Ph.D., Associate Professor

Lisa A. Tell, D.V.M., Assistant Professor  
William P. Thomas, D.V.M., Professor  
Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor  
W. David Wilson, B.V.M.S., M.R.C.V.S., Professor

**Emeriti Faculty**

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Donald G. Low, D.V.M., Ph.D., Professor Emeritus  
William R. Pritchard, D.V.M., Ph.D., J.D., Professor Emeritus  
Livio G. Raggi, D.V.M., Ph.D., Professor Emeritus  
Edward A. Rhode, D.V.M., Professor Emeritus  
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**Affiliated Faculty**

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Celia R. Valverde, D.V.M., Associate Clinical Professor  
Johanna Watson, D.V.M., Ph.D., Assistant Clinical Professor  
James F. Wilson, D.V.M., J.D., Lecturer

## Courses in Medicine and Epidemiology (VME)

**Upper Division Course**

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**217. Evaluation of Diagnostic Tests** (2) III. Gardner  
Lecture/discussion—1.7 hours; laboratory—1 hour. Prerequisite: consent of instructor. Topics include sensitivity, specificity, predictive values, Bayes' Theorem, RDC curves, measuring agreement between tests, series and parallel testing strategies. Emphasis on rational interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.

**255. Animal Health Economics** (3) III. Carpenter  
Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market place) as they relate to animal health are considered. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

**294B. Conservation Biology and Veterinary Medicine** (1) II. Mazet  
Seminar—1 hour. Discussion of current topics in conservation biology as they relate to veterinary medicine; the emphasis is on wildlife. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**Professional Course**

**397T. Tutoring in Veterinary Medicine and Epidemiology** (1-5) I, II, III. The Staff  
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

**Professional Courses**

**401. Small Animal Clinics** (1.5 per week) I, II, III. The Staff (Ling in charge)  
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Resident responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including history taking, physical examinations, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (S/U grading only.)

**402. Large Animal Medicine** (1.5 per week) I, II, III. The Staff (Smith in charge)  
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (S/U grading only.)

**403. Small Animal Medicine** (1.5 per week) I, II, III. The Staff (Ling in charge)  
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic including physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

**410. Husbandry, Feeding and Management of Captive Animals** (2) II. Brooks  
Lecture—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Management and husbandry dynamics for preventative health programs in zoos, aquaria, vivaris, and other environments for exotic pets and wild animals.

**411. Laboratory Animal Medicine** (2) II. Brooks  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic and preventive methods for diseases of rabbits, guinea pigs, hamsters and certain related laboratory rodents will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

**412. Laboratory Animal Medicine** (2) III. Brooks  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species. Emphasis will be placed on animal colony health management technique, and concepts of preventive disease needed by veterinarians in charge of research facilities.

**413. Medical Primatology** (2) III. Roberts  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive non-human primates. (S/U grading only.)

**414. Applications of Epidemiologic Methods to Herd Health** (3) III. Gardner  
Lecture/discussion—2 hours; fieldwork—2 hours. Prerequisite: Epidemiology and Preventive Medicine 405 and 406 or the equivalents or consent of instructor. Epidemiologic applications to health and production problems in animal populations. Topics include test interpretation, decision-tree analysis, time trend analysis, disease reporting, investigation of chronic diseases, microcomputer programs for herd health.

**415. Management and Diseases of Captive Wildlife** (2) II. Phillips  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Defining the role of the veterinarian in the health care and management of captive wildlife species in both private and zoological collections. Lectures concentrate on nondomestic mammalian species, stressing a preventive medical approach, including management of captive environment, infectious and non-infectious disease, anesthesiology, diagnostic techniques/approaches.

**416. Aquatic Animal Medicine** (2) III. Hedrick  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish and of some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

**417. Companion Avian Medicine** (2) II. Tell  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Diseases, diagnostics, medical management and surgery of psittacine species. Avian nutrition, husbandry, and management.

**421. Veterinary Dermatology** (0.75 per week) I, II, III. Ihrke  
Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents are responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (S/U grading only.)

**\*423. Pulmonary Diseases** (0.75 per week) I, II, III. Kittleson

Laboratory—25 hours. Prerequisite: professional standing intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (S/U grading only.)

**425. Zoo and Wildlife Medicine** (0.75 per week) I, II, III. Phillips

Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for assisting in handling and treatment of clinic cases and for learning the techniques of manual and chemical restraint of a wide variety of mammals, birds, reptiles, and fish. Medication problems, anesthetic techniques, and surgical procedures will be discussed and practiced. (S/U grading only.)

**428. Food Animal Surgery** (1.6) III. Smith  
Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (S/U grading only.)

**428L. Food Animal Surgery Laboratory** (0.8) III. Smith

Laboratory—8 three-hour 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.)

**429A. Herd Health Management of Beef, Cattle, Swine, Sheep, and Goats** (4) II. East

Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlot, cow-calf, stocker, swine, sheep, and goat production units are considered, with emphasis on prevention and control of disease.

**430. Raptor Medicine and Rehabilitation** (2) III. Brooks

Lecture—2 hours. Biology, behavior, parasites, diseases, toxins, iatrogenic conditions, diagnostics, treatments, nursing, housing, nutrition, rehabilitation and release techniques for eggs, orphans and adult native California raptors.

**432A-432B-432C. Raptor Clinics** (1-1-1) I-II-III. Brooks

Laboratory—3 hours. Prerequisite: students in the School of Veterinary Medicine or consent of instructor. 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. (S/U grading only.)

**446. Small Animal Reproduction** (1) III. Feldman  
Lecture—7 hours; discussion—1 hour; laboratory—2 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. 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.

**448A. Small Animal Medicine—Level I** (6) I. Nelson

Lecture—5 hours (for 12 weeks). Prerequisite: Veterinary Medicine 447. 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 animal medical diagnoses and therapeutics.

**448B. Small Animal Medicine—Level II** (5.3) II. Ihrke

Lecture—29 sessions; discussion—19 sessions; laboratory—5 sessions. Prerequisite: Veterinary Medicine 447 and course 448A. Medical diseases of the dog and cat. Differential diagnosis of common "signs and symptoms" in small animal veterinary practice. Emphasis on integration of the systemic organ systems approach to medical diagnosis.

**449A. Large Animal Medicine—Level I** (6.1) I. Wilson

Lecture—5 hours (for 12 weeks); laboratory—3 hours (for 2 weeks). Prerequisite: Veterinary Medicine 447. Instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of important infectious and non-infectious diseases of food animals and horses. A problem-based approach to differential diagnosis will be emphasized.

**449B. Level II Advanced Equine Medicine** (4.9) II. Madigan

Lecture—49 hours total. Prerequisite: course 449A. Instruction in the medical aspects of equine practice including large and small farm management practices, sports medicine principles and applications, perinatology and neonatology, and the etiology, epidemiology and control of various infectious and non-infectious conditions of the equine.

**449L. Level II Advanced Equine Medicine Laboratory** (0.6) II. Madigan

Laboratory—6 sessions. Prerequisite: course 449A, course 449B concurrently. Clinical presentation and instruction in treatment of the medical aspects of equine practice. (S/U grading only.)

**450. Small Animal Clinical Immunology** (2.2) III. Pedersen

Lecture—16 hours; laboratory—6 sessions. Prerequisite: basic immunology. Comprehensive discussion of the basic mechanisms of immunologic diseases in animals and description of common immunologic diseases, including clinical presentation, diagnosis and treatment. Emphasis on small animals and analogous disorders of humans. (S/U grading only.)

**457. Veterinary Business Management** (2) II. Wilson

Lecture—10 two-hour sessions. Prerequisite: third- or fourth-year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical record-keeping, money management, business and personal insurance, client relations and tax law. (S/U grading only.)

**460. Equine Behavior and Natural Concepts of Horsemanship** (1) II. Spier

Lecture/laboratory—1 hour. Each session begins with orientation for day and practical equine handling methods follow, emphasizing horse's behavior and recognizing horse's natural reactions to painful, threatening or frightening stimuli. (S/U grading only.)

**481A-481B-481C. Clinic Rounds** (1-1-1) I-II-III. Ling, Smith

Discussion—1 hour. Prerequisite: first- or second-year standing in the School of Veterinary Medicine. Discussion of selected small and large animal cases from the Veterinary Medicine Teaching Hospital. May be repeated once for credit. (S/U grading only.)

**486A. Equine Clinical Neonatology** (1) II. Madigan

Discussion—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (S/U grading only.)

**486B. Equine Clinical Neonatology** (1) III. Madigan

Discussion—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (S/U grading only.)

**487. Comparative Bio-Medical: Form and Function** (2) III. Roberts

Lecture—1 hour; discussion—2 hours. Prerequisite: first- or second-year standing in the School of Veterinary Medicine or consent of instructor. Introduction and basic prerequisite for Zoological Medicine courses, involving comparative biology recommended concepts for nontraditional animal species or alternative pets, zoos, rehabilitation centers, aquaculture, laboratory animals, and non-human primates. (S/U grading only.)

**488. Nondomestic Pet Animal Medicine** (2) III. Phillips

Discussion—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Discussion of practical medical and surgical management of common spontaneous and infectious diseases of nondomestic pets.

**489. Personal, Financial, and Professional Development** (1) I. Wilson

Lecture—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine. Focus on skills essential for successful careers in veterinary medicine. Includes personal finance and investment strategies; understanding personal taxation; book-keeping and accounting; insurance needs; and stress management. (S/U grading only.)

**491. Small Animal Grand Rounds** (0.5) I, II, III. The Staff (Ling in charge)

Discussion—1 hour. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (S/U grading only.)

**492. Large Animal Grand Rounds** (0.5) I, II, III. The Staff (Carlson in charge)

Discussion—1 hour. Prerequisite: professional standing resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (S/U grading only.)

**493. Seminar In Veterinary Medicine** (1) I, II, III. The Staff (Cowgill and Spier in charge)

Seminar—2 hours. Prerequisite: professional standing; resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (S/U grading only.)



## Medieval Studies

(College of Letters and Science)

Winder McConnell, Ph.D., Program Director

Program Office, 522 Sproul Hall (530-752-1219)

World Wide Web: <http://medieval.ucdavis.edu>

### Committee in Charge

Georges Van Den Abbeele, Ph.D. (*French, Italian*)

Winder McConnell, Ph.D. (*German*)

Marijane Osborn, Ph.D. (*English*)

Larry Peterman, Ph.D. (*Political Science*)

Kevin Roddy, Ph.D. (*Medieval Studies*)

Kathleen Stuart, Ph.D. (*History*)

### Affiliated Faculty

Samuel G. Armistead, Ph.D., Professor (*Spanish*)

Dennis Dutschke, Ph.D., Professor (*Italian*)

Ingeborg Henderson, Ph.D., Senior Lecturer  
(*German*)

Phyllis Jestice, Ph.D., Assistant Professor (*History*)

Patricia McKinnon, Ph.D. (*Comparative Literature*)

Kevin Roddy, Ph.D. (*Medieval Studies*), *Academic*

*Federation Excellence in Teaching Award*

Peter Schaeffer, Ph.D., Professor (*German*)

Brenda Schildgen, Ph.D., Lecturer (*Comparative Literature*)

Winfried Schleiner, Ph.D., Professor (*English*)

Raymond Waddington, Ph.D., Professor (*English*)

### The Major Program

The major in medieval studies introduces students to the main features of European civilization during the period from the fall of Rome to the beginnings of the Renaissance. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

**The Program.** The major gives students a broad view of the period and allows the flexibility necessary to accommodate their individual interests. The program offers a series of medieval studies courses providing an excellent introduction to the major, and preparation for advanced work within the individual disciplines. On the upper division level, each student completes course work in specific areas of history (the fall of Rome to the Renaissance), literature (Old and Middle English, including English, French, German, Italian, Russian, Latin), philosophy and religion, arts and language, and political thought. In addition, each student may complete a senior thesis on some selected aspect of medieval culture.

**Career Alternatives.** The major in medieval studies is a liberal arts degree providing excellent preparation for the rigors of the professional schools as well as careers in law, library science, museology, journalism, and teaching.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter

Recommended: Art 1B, History 4A, Philosophy 21, Medieval Studies 20A, 20B, 20C, Religious Studies 10.

Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

#### Depth Subject Matter .....52

History, at least 12 units from History 102B, 121A, 121B, 121C, 201B .....12

Literature: at least 16 units, including two courses from each of the following

- .....16  
(a) English 111, 113A, 113B, 150A, 188, 189; (b) French 115, 141; (c) German 120, 122; (d) Italian 113, 115A, 115B, 139B, 140; (e) Latin 101, 102, 103, 104, 105, 106, 108, 109, 111A, 111B, 111C, 112, 114, 115, 116.

Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190; Religious Studies 102, 110 .....8

Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B; Communication 110, 111, Dramatic Art 156, German 106; Music 121 (note prerequisite), 199 .....8

Political thought, at least one course from Political Science 115, 116, 118A .....4  
Senior thesis, Medieval Studies 190 .....4

**Total Units for the Major .....52**

**Major Advisers.** K. Roddy (*Medieval Studies*).

### Minor Program Requirements:

UNITS

#### Medieval Studies .....24

The minor in Medieval 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, drama, history, literature, music, national languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval transformations. Students may also select a minor with a thematic emphasis.

There is no foreign language requirement for the minor, although knowledge of Latin or a European language is recommended.

The minor must be designed in consultation with a Department Adviser.

**Minor Advisers.** Kevin Roddy (*Medieval Studies*).

### Courses in Medieval Studies (MST)

#### Lower Division Courses

##### 20A. Early Medieval Culture (4) I. Roddy

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.

##### \*20B. The Culture of the High Middle Ages (4)

II. Roddy

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.

##### 20C. Medieval Transformations (4) III. Roddy

Lecture—3 hours; discussion—1 hour. The great medieval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields. GE credit: ArtHum, Wrt.

##### 98. Directed Group Study (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

##### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

#### Upper Division Courses

##### 120A-F. The Medieval World (4) I, II, III. The Staff

(Chairperson in charge)

Lecture—3 hours; discussion—1 hour; term paper. Course deals with selected themes from the Middle Ages: the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as

- (A) The Monastic Orders;
- \* (B) Origins of Universities;
- \* (C) The Seven Liberal Arts, and their Significance in the Middle Ages;
- \* (D) Family and Society;

(E) Chivalry; and

\* (F) Church and State.

GE credit for 120A or 120D or 120E: ArtHum, Wrt.

##### 130A. Special Themes in Medieval Cultures (4)

III. McConnell

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) II. Schleiner

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) I, II, III. The Staff

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.

##### 197T. Tutoring in Medieval Studies (1-4) II, III.

The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

##### 199. Special Study for Advanced

Undergraduates (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

## Mexican-American (Chicano) Studies

See Chicana/Chicano Studies

## Microbiology

See **Biological Sciences—Microbiology; Medical Microbiology (Medicine, School of); Microbiology (A Graduate Group); and Pathology, Microbiology and Immunology (Veterinary Medicine)**

## Microbiology (A Graduate Group)

Linda F. Bisson, Ph.D., Chairperson of the Group  
Group Office, 156 Hutchison Hall (Microbiology Section), (530-752-0262)

**Faculty.** Participating faculty are in the Colleges of Letters and Science and Agricultural and Environmental Sciences, and the Schools of Veterinary Medicine and Medicine.

**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 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.

**Graduate Advisers.** S. Dandekar (*Infectious and Immunologic Diseases*), R.B. LeFebvre (*Pathology, Microbiology and Immunology*), D.M. Ogrzydzak (*Food Science and Technology*), C.W. Price (*Food Science and Technology*), K.M. Scow (*Land, Air and Water Resources*).

## Courses in Microbiology (MIB)

### Graduate Courses

**290C. Advanced Research Conference** (1) I, II, III. The Staff

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.)

**299. Research** (1-12) I, II, III. The Staff

Research under the guidance of dissertation committee. (S/U grading only.)

# Military Science

(College of Letters and Science)

## Reserve Officers' Training Corps (ROTC), Army

Ronald R. Porter, Lt. Col., Chairperson of the Department

Department Office, 125 Hickey Gymnasium  
(530-752-0541)

### Faculty

Captain James M. Desjardin, Assistant Professor  
Captain Todd E. Kramer, Assistant Professor  
Lieutenant Colonel Ronald R. Porter, Professor  
Major Sandra L. Fusco, Associate Professor

## Program of Study

The Military Science Department offers hands-on training in management and leadership. The program stresses the following leadership dimensions: oral and written communications, oral presentations (formal briefings), initiative, sensitivity, influence, planning and organizing, delegation, administrative control, problem analysis, judgement, decisiveness, physical stamina, mission accomplishment, and followership. 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 ceremonies, 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, and (2) a precommissioning 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 precommissioning 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 precommissioning 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, a rifle/pistol team, and opportunities to participate in field training exercises.

## Department Programs

Students are enrolled in military science under one of two programs.

### Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. **There is no military obligation associated with attendance in lower division courses.** 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.

Upper division students receive \$150 subsistence per month after executing a contract agreeing to complete the course and **accept a commission if offered.** During the course all military science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp (advanced camp) 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 who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two-year program. 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 and two-year Reserve Forces Duty 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 \$450 per year for textbooks, up to \$400 per year for miscellaneous fees such as laboratory, student activity, transcript, and graduation fees, and a subsistence allowance of \$150 a month for 10 months for each year that the scholarship is in effect.

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. There are two cycles available for submission of the four-year scholarship application. High school juniors can compete for an Early Cycles scholarship by submitting their application complete and postmarked by July 15 between their junior and senior years. Applicants will receive notification of their final status by November 1. As high school seniors, students compete for the Regular Cycle scholarship by submitting their application complete and postmarked by December 1. Those applicants not selected in the Early Cycle are considered in the Regular Cycle competition. Applicants will receive notification of their final

status by March 1 of their senior year in high school. Interested applicants should see their high school counselor for an application or contact UC Davis, Department of Military Science at 530-752-7682.

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, and have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is January 15 for the two-year scholarship and February 15 for the three-year scholarship. Students apply for and are awarded these Army scholarships through the Military Science Department.

### Leadership Laboratory

During the course of the school year, several weekends and two hours per week are spent in the conduct of 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 the Army ROTC Advanced Camp, held at Fort Lewis, Washington.

### Military Qualifications Standards (MQS) System

During the program of study, students will become familiar with the MQS System, which is designed to articulate skills and knowledge that are required of ROTC commissionees to begin military service. The components of the MQS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 73 military skills which are categorized into 12 subject areas. They are basic soldiering tasks fundamental to the military professional and serve as the basis for future branch-directed specialty training.

The 24 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership and ethics, administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of five designated fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

## Academic Credit

**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.

**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 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.

**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.

## Courses in Military Science (MSC)

### Lower Division Courses

#### 11. Roles and Organization of the U.S. Army (1) I.

Lecture—1 hour. Prerequisite: lower division standing. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept. Impact of civil-military relations and Soviet military power on role of Army studied in context of current problems.

#### 12. Introduction to Military Leadership (2) I.

Lecture—2 hours. Prerequisite: lower division standing, and consent of instructor. Introduction to leadership theories used in military organizations. Course surveys the duties and responsibilities of junior Army officers, the general environment in which they work, and leadership roles performed. Introduces military map reading skills.

#### 13. Introduction to Basic Military Operations (1) III.

Lecture—1 hour. Prerequisite: lower division standing. Basic military tactical theories and their application at the individual and squad level. Course introduces military tactical operations, and covers military first aid. Principles of war as introduced in course 11 are applied to offensive and defensive tactics.

#### 14A. Introduction to Military Leadership Skills (0.5) I.

Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. 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 are also covered. (P/NP grading only.)

#### 14B. Introduction to Military Leadership Skills (0.5) II.

Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual's role in the squad, the basic organizational element of the Army. As students gain capabilities, supervisory controls are reduced. (P/NP grading only.)

#### 14C. Introduction to Military Leadership Skills (0.5) III.

Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company through individual levels emphasized. Interrelationship of squad and platoon organizations is explored. (P/NP grading only.)

#### 21. Military History (2) III.

Lecture—2 hours. Prerequisite: lower division standing; course 11 or consent of instructor. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War.

#### 22A. Intermediate Military Leadership and Operations I (2) II.

Lecture—2 hours. Prerequisite: lower division standing; course 12 or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers.

#### 22B. Intermediate Military Leadership and Operations II (2) I.

Lecture—2 hours. Prerequisite: lower division standing; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22A are studied in more depth enabling each student to improve on targeted weaknesses. Instruction is presented in intermediate defensive tactics at the squad level.

**24A. Individual Military Leadership Skills (0.5) I.** Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers. (P/NP grading only.)

**24B. Individual Military Leadership Skills (0.5) II.** Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Personal supervisory and leadership styles are developed in a supervised laboratory environment. Students are rotated through squad and team-level supervisory positions, given responsibility concomitant with positions. (P/NP grading only.)

#### 24C. Individual Military Leadership Skills (0.5) III.

Laboratory—2 hours. Prerequisite: lower division standing; courses 14A, 14B, 14C and 21, or consent of instructor. Students are prepared for transition from junior leader to senior non-commissioned officer. Chain of command and hierarchical responsibilities and reporting requirements are demonstrated in a laboratory setting. (P/NP grading only.)

### Upper Division Courses

#### 131. Advanced Military Leadership and Management (2) III.

Lecture—2 hours. Prerequisite: upper division standing; course 22A or consent of instructor. Course addresses different types of power and influence a military leader may use, reviews counseling techniques, and introduces basic management skills. Instruction provided on the various branches in which a commissioned officer may serve.

#### 132A. Advanced Military Operations (2) I.

Lecture—2 hours. Prerequisite: upper division standing; course 22B or consent of instructor. First phase of advanced military tactical operations. Advanced work on topographical maps, navigation, and orienteering techniques. Instruction is also provided on resource planning techniques and military intelligence.

#### 132B. Advanced Military Operations (2) II.

Lecture—2 hours. Prerequisite: upper division standing; course 132A or consent of instructor. Continuation of course 132A. Military tactical theories and their application in offense and defense are presented at the platoon and company level. Course covers in-depth analysis of the principles of war related to offensive and defensive operations.

#### 134A. Military Organizational Leadership Skills (0.5) I.

Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. Students develop interpersonal and management skills by practical application of leadership of military organizations in a supervised leadership laboratory. Advanced-level military skills presented. Students fulfill the roles of senior non-commissioned officers. (P/NP grading only.)

#### 134B. Military Organizational Leadership Skills (0.5) II.

Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. As more complex material is presented in classroom, the laboratory environment becomes more challenging. Students serve as senior non-commissioned officers in squad, platoon and company levels, given appropriate authority and responsibility. (P/NP grading only.)

#### 134C. Military Organizational Leadership Skills (0.5) III.

Laboratory—2 hours. Prerequisite: upper division standing; courses 24A-24B-24C or consent of instructor. Students prepared for advanced summer training experience by extensive requirements to plan, organize and conduct military operations in field environments; individual leadership potential is closely assessed in the laboratory environment. (P/NP grading only.)

#### 141. U.S. Army Management Systems (2) III.

Lecture—2 hours. Prerequisite: upper division standing and course 131. Army decision making, personnel and equipment management. Includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

#### 142. Military Law (2) II.

Lecture—2 hours. Prerequisite: upper division standing and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

#### 143. Military Ethics and Professionalism (2) I.

Lecture—2 hours. Prerequisite: upper division standing and course 142. Profession of arms, its characteristics, uniqueness, roles, and responsibilities. Discussion topics include the professional soldier's responsibilities to the Army and the Nation, and the need for ethical conduct. Case studies are used to develop ethical decision making skills.

#### 144A. Military Training Leadership Skills (0.5) I.

Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, and 141. Develops and exercises the leadership skills necessary to plan, coordinate and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor planning, media utilization and evaluation of learning. Students perform as cadet officers. (P/NP grading only.)

#### 144B. Military Training Leadership Skills (0.5) II.

Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, and 141. Requirements for training of all other levels of the cadet corps are given to students for conduct in laboratory environment (under supervision). Students placed in realistic role of junior officer with appropriate level of responsibility. Students perform as cadet staff officers. (P/NP grading only.)

#### 144C. Military Training Leadership Skills (0.5) III.

Laboratory—2 hours. Prerequisite: upper division standing; courses 134A, 134B, 134C, 141. Final laboratory in military science sequence; students are prepared for final testing and certification prior to commissioning as officers. Students will demonstrate all leadership skills necessary to commissioned officers. Students perform leadership tasks at platoon, company, and battalion levels. (P/NP grading only.)

#### 191. Special Studies in Military Science (2)

Porter

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 twice for credit when topic differs. (P/NP grading only.)

## 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 30 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 include \$150 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. All scholarship recipients must graduate and be commissioned before their 27th birthday (may be waived for prior military personnel). 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 700 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. Scholarship boards meet throughout the year for scientific and technical majors and in July for all academic majors. Scholarships also include a \$150 monthly stipend throughout the school year, required books and fees. Other loans and grants may be used towards room and board costs.

**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.

**AFROTC at UC Berkeley**

AFROTC Detachment 85  
Hearst Gym, Berkeley, CA, 94720-3610  
(1-800-852-5747 or 510-642-3572);  
e-mail: brown@uclink4.berkeley.edu  
World Wide Web:  
<http://www.berkeley/dept/aerospace>

To receive hands-on leadership and management practice, freshmen and sophomores take a one-hour academic course and a two-hour Leadership Laboratory each week; juniors and seniors take a three-hour course plus the lab. All units can be used as elective credit towards graduation. See the Military Sciences course listings in the UC Berkeley catalog. Classes are held during the fall and spring semesters and the curriculum includes the history of airpower, leadership and management topics, communication skills, and national security issues.

Between the sophomore and junior years, cadets compete to attend a four- or six-week field training program at a designated Air Force base. This competitive program consists of physical conditioning, outdoor survival training, career and aircraft orientations and an evaluation of leadership potential. Additional optional training opportunities are available during the summer months and include the Royal Air Force Exchange Program, Pentagon Internships, Jump School and Glider Training at the Air Force Academy, and summer job shadowing. Students are also encouraged to participate in optional orientation flights, base visits, and community service projects throughout the school year.

**AFROTC at CSU Sacramento**

California State University Sacramento  
Public Service Building, Room 208  
6000 J. Street  
Sacramento, CA 95819-6094  
(530-278-7315)

The CSUS Department of Aerospace Studies offers a two-, three-, or four-year programs leading to a commission in the U.S. Air Force. About 30 percent of the corps commute to CSUS from UC Davis. All course work (12 or 16 semester units) is completed on the CSUS campus. Drills and courses are normally offered on Tuesdays, Wednesdays, and Thursdays. Field training is conducted at an active Air Force base during part of the summer, normally between the student's sophomore and junior years.

Upon completion of the program (integrated with UC Davis' quarter system) and all requirements for a bachelor's degree, cadets are commissioned as second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and are selected may enter pilot or navigator training after graduation, or serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of entry to active duty to continue their education or may apply for Air Force sponsored graduate study to begin immediately upon entry to active duty. Due to firm scheduling requirements for the AFROTC program, students are encouraged to work closely with their academic advisers in planning their academic program.

AFROTC offers 3-year and 2-year scholarships to qualified students. Applications are accepted in any academic discipline; however, particular emphasis is given to applicants in the fields of engineering, computer science, mathematics, and physics.

Application should normally be no later than the first quarter of a student's sophomore year. Juniors, seniors, and graduate students may also apply under certain conditions. Contact the Unit Officer in the Aerospace Studies Department at CSUS (916-278-7315) for information.

**Naval ROTC**

Berkeley program:  
Department of Naval Science  
152 Hearst Gymnasium, UC Berkeley  
Berkeley, CA 94720-3640  
(1-800-430-3014); World Wide Web:  
<http://ls.berkeley.edu/dept/navsci/A1.html>

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. 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:

- NS 3 Leadership and Management
- NS 10 Ship Systems

Junior:

- NS 12A Navigation and Naval Operations I
- NS 12B Navigation and Naval Operations II

Senior year:

- NS 401 Naval Ship Systems
- NS 412 Leadership and Ethics

In lieu of NS401, NA10, NS12A and NS12B, Marine Corps students participate in Marine Seminars and complete MA154, History of Littoral Warfare and MA20, Evolution of American 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, leadership and management, 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.

**Molecular Biosciences**

(School of Veterinary Medicine)

Shri N. Giri, B.V.Sc., Ph.D., Chairperson of the Department

Department Office, 1311 Haring Hall (530-752-1059)

World Wide Web: <http://www.vetmed.ucdavis.edu/vmb/m.biosciences.html>

**Faculty**

Alan R. Buckpitt, Ph.D., Professor  
Gino A. Cortopassi, Ph.D., Associate Professor  
Francis D. Galey, D.V.M., Ph.D., Associate Professor  
(*Molecular Biosciences, California Veterinary Diagnostic Laboratory*)

Shri N. Giri, B.V.Sc., Ph.D., Professor  
Robert J. Hansen, Ph.D., Professor  
Cynthia Kollias-Baker, D.V.M., Ph.D., Assistant Professor  
(*Molecular Biosciences, California Veterinary Diagnostic Laboratory*)

Michael E. Mount, D.V.M., Ph.D., Associate Professor  
Isaac N. Pessah, Ph.D., Associate Professor  
Quinton R. Rogers, Ph.D., Professor  
Henry J. Segall, Ph.D., Professor  
Scott D. Stanley, Ph.D., Assistant Professor  
(*Molecular Biosciences, California Veterinary Diagnostic Laboratory*)

Philip R. Vulliet, D.V.M., Ph.D., Professor  
Hanspeter Witschi, M.D., Professor

**Emeriti Faculty**

Arthur L. Black, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Victor W. Burns, Ph.D., Professor Emeritus  
 Gaylord M. Conzelman, Jr., Ph.D., Professor Emeritus  
 Richard A. Freedland, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 James G. Morris, Ph.D., Professor Emeritus  
 Otto G. Raabe, Ph.D., Professor Emeritus

**Courses in Molecular Biosciences (VMB)****Lower Division Course**

**92. Internship** (1-12) I, II, III. The Staff  
 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) I, II, III, summer. The Staff  
 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) I, II, III. The Staff (Chairperson in charge)  
 (P/NP grading only.)

**Graduate Courses**

**\*205A. Intermediary Metabolism of Animals** (4) I. The Staff  
 Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetics effects. Dynamics of animal metabolism including pools and turnover rates. Offered in alternate years.

**\*205B. Intermediary Metabolism of Animals** (3) II. Rogers, Hansen, Hershey (Biological Chemistry), Rucker (Nutrition)  
 Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in alternate years.

**\*247. Natural Toxicants** (2) III. Segall  
 Lecture—2 hours. Prerequisite: organic chemistry, Biological Sciences 102 and 103, or consent of instructor. Toxicity and metabolism of natural toxicants with emphasis on the toxic plants present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxicants are discussed. Offered in alternate years.

**253. Metabolism of Toxicants and Drugs** (2) II. Buckpitt  
 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.

**258. Receptor-Mediated Mechanisms** (2) III. Pessah  
 Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern methods for studying physiological receptors including radioligand binding analysis, ion transport/flux measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical

concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug/toxicant interactions. Offered in alternate years.

**258L. Laboratory in Receptor Methods** (1) III. Pessah  
 Laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 120L, course 258 (may be taken concurrently). Design and practical application of receptor binding techniques including subcellular fractionation, equilibrium and kinetic radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in alternate years.

**260. Toxicologic Pathology** (3) II. Witschi, Wilson  
 Lecture—3 hours. Prerequisite: Pharmacology and Toxicology 201, 202, and 203. Provide introduction to organ system pathology; provide understanding of pathogenesis and significance of chemically induced tissue injury in the various organs of the body. Offered in alternate years.

**\*265. Mass Spectrometric Methods in Pharmacology and Toxicology** (3) II. The Staff  
 Lecture/discussion—3 hours. Prerequisite: Biological Sciences 102, and Chemistry 128A or 128B or 128C. Intended to enable students in pharmacology, toxicology, and biological chemistry to evaluate and interpret mass spectrometric techniques and results. Emphasis on identification of metabolites and biological macromolecules and quantitative stable isotope methods.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)  
 Seminar—1 hour. (S/U grading only.)

**297T. Tutoring in Veterinary Pharmacology and Toxicology** (1-5) I, II, III. The Staff (Chairperson in Charge)  
 Students assist in preparation and teaching of courses in Veterinary 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. May be repeated for credit up to 5 units. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in Charge)  
 Prerequisite: consent of instructor. Group study in selected areas of Pharmacology and Toxicology. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
 (S/U grading only.)

**Professional Course**

**397T. Tutoring in Molecular Biosciences** (1-5) I, II, III. The Staff  
 Prerequisite: graduate or professional student standing and consent of instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

**Professional Courses**

**405. Veterinary Clinical Pharmacology** (2) II. Vulliet  
 Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Pharmacological basis of therapeutic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, its dosage form, route of administration and dose for treatment of certain disease conditions. (S/U grading only.)

**475. Diagnosis and Treatment of Food Animal and Equine Poisoning** (2) III. Mount  
 Lecture—20 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in livestock, horses and other ungulate stock emphasizing diagnosis and treatment. Poisonous plants are covered in this course.

**480. Diagnosis and Treatment of Small Animal Poisoning** (2) II. Mount  
 Lecture—20 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in dogs, cats, and pet birds, emphasizing diagnosis and treatment.

**485. Advanced Clinical Nutrition** (2) II. Marks  
 Lecture—14 sessions; laboratory—2 three-hour sessions; discussion—2 two-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or graduate student with consent of instructor. Advanced training in the principles and practice of small animal clinical nutrition. (S/U grading only.)

**Music**

(College of Letters and Science)

Wayne Slawson, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Arts Building  
 (530-752-0888; Fax: 752-8818)

World Wide Web: <http://musdra.ucdavis.edu>

**Faculty**

Ross Bauer, Ph.D., Professor  
 Robert S. Bloch, M.A., Professor  
 Anna Maria Busse Berger, Ph.D., Professor  
 Jonathan Elkus, M.A., Lecturer  
 Andrew D. Frank, M.A., Professor  
 D. Kern Holoman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*  
 Zoila Mendoza, Ph.D., Assistant Professor  
 Maria Niederberger, Ph.D., Lecturer  
 David A. Nutter, Ph.D., Professor  
 Pable Ortiz, D.M.A., Associate Professor  
 Christopher A. Reynolds, Ph.D., Professor  
 Wayne Slawson, Ph.D., Professor  
 Jeffrey Thomas, Assistant Professor

**Emeriti Faculty**

Sydney R. Charles, Ph.D., Professor Emeritus  
 Albert J. McNeil, M.S., Professor Emeritus  
 Jerome W. Rosen, M.A., Professor Emeritus  
 Richard G. Swift, M.A., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*

**Faculty Affiliates in Applied Music**

Dona Lee Brandon, M.S.M., Lecturer (*organ*)  
 Lois Brandwynne, M.A., Lecturer (*piano*)  
 Tod Brody, B.A., Lecturer (*flute*)  
 Susan Lamb Cook, M.A., Lecturer (*cello*)  
 Phebe Craig, M.M., Lecturer (*harpsichord*)  
 Thomas Derthick, B.M., Lecturer (*string bass*)  
 Joel Elias, M.M., Lecturer (*trombone*)  
 Elizabeth Field, M.M.A., Lecturer (*violin*)  
 Stephanie Friedman, M.A., Lecturer (*voice*)  
 David Granger, M.M., Lecturer (*bassoon*)  
 Stanley Lunetta, M.A., Lecturer (*percussion*)  
 Calvin Lymos, B.A. (*Gospel Choir*)  
 Michael McMullen (*Jazz Band*)  
 Scott Macomber, M.M. (*trumpet*)  
 Peter Nowlen, B.M., Lecturer (*French horn*)  
 Deborah Pittman, M.A., Lecturer (*clarinet*)  
 Neal Rogers, B.M. (*voice*)  
 Deborah Shidler, B.M.E., Lecturer (*oboe*)  
 John Tchicai (*jazz improvisation*)

**The Empeyrean Ensemble**

Ross Bauer, director  
 Tod Brody, flute  
 Deborah Shidler, oboe  
 Peter Josheff, clarinet  
 Carla Wilson, bassoon  
 Peter Nowlen, French horn  
 Daniel Kennedy, percussion  
 Karen Rosenak, piano  
 Eric Zivian, piano  
 Terrie Baune, violin

Uri Wassertzug, viola  
Jennifer Culp, cello  
Thomas Derthick, bass

**The UCD Wind Quintet**

Deborah Shidler, oboe  
David Granger, bassoon  
Deborah Pittman, clarinet  
Tod Brody, flute  
Peter Nowlen, French horn

**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, theory and performance.

**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, criticism, and performance during the last two years of undergraduate work.

**Career Alternatives.** Many students who graduate with a degree in music continue on to careers in medicine, law, or business. According to the American Medical Association, the undergraduate major with the highest rate of acceptance into medical school is not chemistry or physics, but music. Students who graduate with a B.A. in music from UC Davis have gone on to graduate programs in music at major universities and conservatories in the country. Some have become professors at distinguished universities or have received teaching credentials to teach at primary or secondary schools; others have become editors or found employment in music advertising or record companies.

**A.B. Major Requirements:**

|                                                                                                                                                                                                        |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                                                                                                                        | UNITS        |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                | <b>39-42</b> |
| Music 2A, 2B, 2C, 4A, 4B, 4C, 5A, 5B, 5C,<br>24A, 24B, 24C .....                                                                                                                                       | 36-39        |
| Music 30, 31 (or the equivalent as determined<br>in consultation with major adviser), one<br>year .....                                                                                                | 3            |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                      | <b>44</b>    |
| Music 104A, 104B, 104C .....                                                                                                                                                                           | 12           |
| Music 124A, 124B .....                                                                                                                                                                                 | 8            |
| At least 16 units selected from Music 107A,<br>107B, 107C (Note: only 3 units of 107,<br>electronic music, may be counted toward<br>the major), 108A, 108B, 111, 112, 121,<br>122, 190, 198, 199 ..... | 16           |
| At least 8 units in performance courses.....                                                                                                                                                           | 8            |
| Select from Music 130 or 131, 141, 142,<br>143, 144, 145, 146.                                                                                                                                         |              |
| <b>Total Units for the Major</b> .....                                                                                                                                                                 | <b>83-86</b> |

**Major Advisers.** D.A. Nutter, C.A. Reynolds.

**Minor Program Requirements:**

|                                                                                                                                                                  |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                                  | UNITS     |
| <b>Music</b> .....                                                                                                                                               | <b>22</b> |
| A minimum of 16 units of upper division Music<br>courses .....                                                                                                   | 16        |
| Courses chosen with adviser's consent<br>from: Music 105, 107, 110, 129                                                                                          |           |
| A minimum of six units in upper division music<br>performance courses (Music 140, 141,<br>142, 143, 144, 145, 146, 147, 154) may<br>count toward the minor ..... | 6         |
| Lower division preparatory work to be<br>determined in consultation with minor<br>advisers.                                                                      |           |

**Foreign Language Requirement.** Attention is called to the requirements in foreign languages for graduate degrees in music.

**Beginning and transfer students** must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with *The Little Preludes* of Bach is prerequisite to upper division courses in the

major. Students with deficiencies will be required to pass Music 2A, 2B, 2C. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

**Student Performing Activities.** The Department of Music presents over 100 concerts each year, offering performance opportunities for both majors and non-majors in the UCD Symphony Orchestra, University Chorus, Concert Band, Early Music Ensemble, Baroque Chamber Orchestra, Chamber Singers, University Jazz Band, Gospel Choir, and numerous chamber ensembles. Also affiliated with the department is the California Aggie Marching Band.

The large groups regularly present three concerts each year, while chamber ensembles perform frequently in the weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Dramatic Art 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 talented non-majors.

**Faculty and Facilities.** The faculty is noted for its achievements in a variety of areas. The musicologists are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. Two music journals are housed in the department, *19th Century Music* and *Beethoven Forum*.

The regular faculty is joined during one quarter each year by a visiting Artist-in-Residence, a distinguished performer who gives public concerts and lectures and who works with students informally. Professional performance groups in residence at UC Davis include the UC Davis Wind Quintet and the Empyrean Ensemble (formerly the UC Davis Contemporary Players).

The department's facilities include a large collection of Renaissance, Baroque, and modern instruments, the Computer and Electronic Music Studio, practice and rehearsal rooms, and an excellent music library with some 20,000 recordings, CDs, laser discs and videos. In addition, the library houses the Jan Popper Collection of opera scores, books, and memorabilia.

**Teaching Credential Subject Representative.** See the section on the Teacher Education Program.

**Graduate Study.** The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology/criticism, and conducting, and the Ph.D. degree in composition/theory and musicology/criticism. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

**Graduate Adviser.** P.V. Ortiz.

**Courses in Music (MUS)**

**Lower Division Courses**

**2A-2B-2C. Keyboard Competence** (1-1-1) I-II-III.  
The Staff

Laboratory—1 hour. Prerequisite: concurrent enrollment in course 4A-4B-4C; keyboard diagnostic examination (not open for credit to students who have passed the exam). Designed to train students to meet the minimal piano requirements for the major in music. All music majors will be expected to perform scales, modulations, to realize figured basses, and to harmonize a given melody at sight.

**3A. Introduction to Music Theory** (4) I. Elkus; II. Niederberger; III. The Staff  
Lecture—1 hour; recitation—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.

**3B. Introduction to Music Theory** (4) II.  
The Staff; III. Niederberger  
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3A. Continuation of course 3A. Intended for the general student.

**4A-4B-4C. Elementary Theory** (4-4-4) I-II-III.  
Niederberger

Lecture/discussion—3 hours; practice—2 hours. Prerequisite: keyboard competence; keyboard diagnostic examination; students must pass the exam or take course 2A-2B-2C concurrently. Development of music writing and listening skills through the study of music fundamentals, tonal species counterpoint, harmony, score reading, analysis of repertoire. Intended primarily for music majors.

**5A-5B-5C. Intermediate Theory** (4-4-4) I, II, III.  
Ortiz

Lecture/discussion—3 hours; practice—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of harmony; keyboard harmony; analysis of repertoire.

**10. Introduction to Musical Literature** (4) I.  
Nutter; II. Holoman; III. Slawson  
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.

**24A. Introduction to the History of Music, I** (4)  
I. Reynolds  
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4A or 3A (concurrently). Intended primarily for majors in music. History of music from the late Baroque to the Classical Period. GE credit: Wrt.

**24B. Introduction to the History of Music, II** (4)  
II. Reynolds  
Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 3B (concurrently). Intended primarily for majors in music. History of music from the Classical Period to the nineteenth century. GE credit: Wrt.

**24C. Introduction to the History of Music, III** (4)  
III. Reynolds  
Lecture—3 hours; listening section—1 hour. Prerequisite: course 4B or 3B; course 4C (concurrently). Intended primarily for majors in music. History of music from the nineteenth century to the present. GE credit: Wrt.

**28. Introduction to Afro-American Music** (4) III.  
The Staff  
Lecture—3 hours; listening and discussion—1 hour. A study of the Afro-American rhythm, field hollers, work songs, spirituals, blues, gospel, and jazz; the contrast between West African, Afro-Caribbean, and Afro-Cuban musical traditions. GE credit: Div, Wrt.

**30A-U. Applied Study of Music: Intermediate**  
(1) I, II, III. The Staff

Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertory; 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; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit. Offered as demand indicates.

**31A-U. Applied Study of Music: Intermediate (Individual) Performance Instruction** (2) I, II, III.  
The Staff

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; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit.

**32. Singing for Actors** (1) I, II, III. Friedman  
Performance—1 hour. Prerequisite: lower division standing, consent of instructor. Elements of basic singing techniques, through selected exercises, vocalises, and songs. Intended for actors and others who need to sing in public. (P/NP grading only.)

\*Course not offered this academic year.



**40. University Jazz Band** (2) I, II, III. McMullen  
Rehearsal—4 hours. Prerequisite: lower division standing, 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.)

**41. University Symphony** (2) I. Thomas; II, III. Holoman  
Rehearsal—4 hours. Prerequisite: admission subject to audition before the 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.)

**42. University Chamber Singers** (2) I, II, III. Thomas  
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.)

**43. University Concert Band** (2) II, III. Elkus  
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.)

**44. University Chorus** (2) I, II, III. Thomas  
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.)

**45. Early Music Ensemble** (2) I, II, III. Nutter  
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.)

**46. Chamber Music Ensemble** (1) I, II, III. The Staff (Granger in charge)  
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.)

**47. University Wind Ensemble** (2) I. Nowlen  
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.)

**54. University Gospel Choir** (2) I, II, III. Lymos, Stewart  
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 54.) (P/NP grading only.)

**98. Directed Group Study** (1-5) The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**103. Workshop in Composition** (3) I. Niederberger; II, III. Frank  
Workshop—3 hours. Prerequisite: course 4C. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies. Course will allow students to explore the techniques and materials of musical composition. May be repeated for credit. (P/NP grading only.)

**104A-104B-104C. Advanced Theory** (4-4-4) I-II-III. Bauer

Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures: analyses and projects in composition.

**105. History and Analysis of Jazz** (4) I. Bauer  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3A or 10 or the equivalent. Jazz will be studied in its historical and cultural contexts; the evolution of jazz styles will be analyzed. Lectures, discussion/guided listening sections, and selected readings. Designed for non-majors. GE credit: ArtHum, Div, Wrt.

**106. History of Rock Music** (4) III. Reynolds  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3A-3B or 10 or consent of instructor. Rock studied in its musical, historical, and cultural contexts; analysis of the evolution of rock styles. Includes guided listening sections and selected readings. Designed for non-majors. GE credit: ArtHum, Wrt.

**107A. Computer and Electronic Music** (3) I. Ortiz  
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.

**107B. Computer and Electronic Music** (3) II. Slawson  
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. Limited enrollment.

**\*107C. Computer and Electronic Music** (3) III. Slawson  
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107B and consent of instructor. Continuation of course 107B. Limited enrollment.

**108A-108B. Orchestration** (2-2) I. Niederberger; II. Frank  
Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.

**\*109. Masterworks in Performance** (2)  
Lecture—2 hours. Prerequisite: course 10 recommended. Thorough score study of a single masterwork to be performed on campus during the quarter. Guided listening, selected readings, analysis and study of composer's milieu. Recommended especially for members of the performing ensembles scheduled to present the work.

**110A. The Music of a Major Composer: Beethoven** (4) I. Frank  
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.

**\*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.

**\*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.

**\*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.

**110E. The Music of a Major Composer: Haydn** (4) III. Busse Berger  
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. Offered in alternate years. GE credit: ArtHum, Wrt.

**110F. American Masters** (4) II. Frank  
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. Offered in alternate years. GE credit: ArtHum, Wrt.

**111. Choral Conducting** (2) I. Thomas  
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral ensembles.

**\*112. Instrumental Conducting** (2)  
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting instrumental ensembles. Offered in alternate years.

**121. Topics in Music History and Criticism** (4) II. Nutter; III. Busse Berger  
Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and 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. GE credit: Wrt.

**122. Topics in Analysis and Theory** (4) I. Frank  
Seminar—4 hours (includes selected listening). Prerequisite: courses 5C and 25C. 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. GE credit: Wrt.

**124A. History of Western Music: Middle Ages to 1600** (4) I. Busse Berger  
Lecture—3 hours; listening—1 hour. Prerequisite: course 24C and 4C. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: Wrt.

**124B. History of Western Music: 1600 to 1750** (4) II. Busse Berger  
Lecture—3 hours; listening—1 hour. Prerequisite: course 124A. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: Wrt.

**125. Performance and Culture** (4) III. Mendoza  
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Division of Humanities or Social Sciences or consent of instructor. Introduction to the interdisciplinary study of public expressive forms. Comparative analysis of music, dances, rituals, and dramas from around the world in their social and cultural contexts. Offered in alternate years.

**\*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.

**\*127. Music from Latin America** (4) I. Ortiz  
Lecture—3 hours; discussion—1 hour. Prerequisite: Spanish 24 or 33. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica nortena, musica andina) as well as its implications in other musical genres. Taught in Spanish. For non-majors. Offered in alternate years. (Former course 27.) (Same course as Spanish 171.)

**\*129. World Music** (4) II. Mendoza  
Lecture—3 hours; listening—1 hour; selected readings. Prerequisite: course 3A-3B or 10 recommended. Intended for non-majors. Studies in selected areas of non-western music, including appropriate instrumental and performing techniques, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of the music. GE credit: Div, Wrt.

**130A-U. Applied Study of Music: Advanced (1)** I, II, III. The Staff

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; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit. Offered as demand indicates.

**131A-U. Applied Study of Music: Advanced (Individual) (2)** I, II, III. The Staff

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; **(S)** Lute; **(T)** Viola da gamba; **(U)** Recorder. May be repeated for credit.

**132. Singing for Actors (1)** I, II, III. Friedman  
Performance—1 hour. Prerequisite: upper division standing or consent of instructor. Elements of basic singing techniques, through selected exercises, vocalises, and songs. Intended for actors and others who need to sing in public. (P/NP grading only.)

**140. University Jazz Band (2)** I, II, III. McMullen  
Rehearsal—4 hours. Prerequisite: upper division standing or 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.)

**141. University Symphony (2)** I. Thomas; II, III. Holoman  
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.)

**142. University Chamber Singers (2)** I, II, III. Thomas  
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.)

**143. University Concert Band (2)** II, III. Elkus  
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.)

**144. University Chorus (2)** I, II, III. Thomas  
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.)

**145. Early Music Ensemble (2)** I, II, III. Nutter  
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.)

**146. Chamber Music Ensemble (1)** I, II, III.

The Staff (Granger in charge)  
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.)

**147. University Wind Ensemble (2)** I. Nowlen  
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.)

**154. University Gospel Choir (2)** I, II, III. Lymos, Stewart  
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.)

**\*190. Senior Seminar in Music (4)** I.  
Lecture—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor; course 104C recommended. Intended primarily for majors in music intending to apply for graduate programs in music history, composition, or theory. Review of musical skills, issues in theory and analysis, and the history and literature of music.

**198. Directed Group Study (1-5)** I, II, III.  
The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**\*200. Music Research (4)**  
Seminar—3 hours; term paper. Introduction to problems and techniques of research; practical application of music bibliography to questions about significant issues in musicology, music theory, and performance practice.

**\*201. Advanced Music Research and Criticism (4)**  
Seminar—3 hours; term paper. Study and practice of expository writing about music. Application of advanced research techniques in writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.

**202. Notation (4)** III. Nutter  
Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music.

**203. Music Composition (4)** I. Bauer; II. Ortiz; III. Frank  
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.

**\*204. Advanced Conducting (3)**  
Tutorial—2 hours; practicum—2 hours. Prerequisite: courses 111, 112, or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance.

**\*207. Advanced Electronic and Computer Music (4)**  
Seminar—2 hours; plus individual student/instructor meeting—2 hours. Prerequisite: courses 107A-107B-107C. Advanced composition of computer and electronic music with the Sun 3-based computer-music system and associated facilities.

**\*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.

**210B. Proseminar in Music (Musicology and Criticism) (4)** II. Reynolds  
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.

**\*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 (Seeger) to analysis of individual genres to sociological study.

**221. Topics in Music History (4)** I. Busse Berger; III. Holoman  
Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

**222. Techniques of Analysis (4)** I. Slawson; II. Bauer  
Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.

**\*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.

**\*224. Performance in the Americas (4)**  
Seminar—3 hours; term paper. Ethnomusicological and anthropological approaches to the study of public performance in the Americas. It proposes 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.

**299. Individual Study (1-12)** I, II, III. The Staff (Holoman in charge)  
(S/U grading only.)

**Teaching Methods Courses**

**\*300. The Teaching of Music (3)**  
Lecture—3 hours. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

**\*301. The Teaching of Music (3)**  
Lecture—3 hours. Prerequisite: course 5C or the equivalent. Methods of teaching music in grades 7-12.

**Instrumental Methods.** The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

**\*321A-321B. Stringed Instruments (1-1)**  
Discussion—2 hours. Prerequisite: course 4C.

**\*322. Brass Instruments (1)**  
Laboratory—2 hours. Prerequisite: course 4C. Offered in alternate years.

**\*323A-323B. Woodwind Instruments (1-1)**  
Discussion—2 hours. Prerequisite: course 4C.

**\*324. Percussion Instruments (1)**  
Laboratory—2 hours. Prerequisite: course 4C. Considers teaching of percussion instruments. Survey course. Offered in alternate years.

**396. Teaching Assistant Training Practicum (1-4)** I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

# Native American Studies

(College of Letters and Science)

Inés Hernández-Ávila, Ph.D., Chairperson of the Department  
Department Office, 2401 Hart Hall (530-752-3237)  
World Wide Web:  
<http://cougar.ucdavis.edu/nas/home.html>

## Faculty

Steven J. Crum, Ph.D., Associate Professor  
Inés Hernández-Ávila, Ph.D., Associate Professor  
George C. Longfish, M.F.A., Professor  
Martha J. Macri, Ph.D., Associate Professor  
Victor D. Montejo, Ph.D., Associate Professor  
Luana K. Ross, Ph.D., Associate Professor  
Stefano Varese, Ph.D., Professor

## Emeriti Faculty

Jack D. Forbes, Ph.D., Professor Emeritus  
Sarah Hutchison, M.A., Lecturer Emeritus  
David Risling, M.A., Senior Lecturer Emeritus

## Affiliated Faculty

Anne Dannenberg, Ph.D., Lecturer

## The Major Program

Native American Studies focuses upon the indigenous peoples of North, Central, and South America. The program is interdisciplinary in its approach to the world of American Indians and offers a comprehensive and comparative perspective.

**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, however, 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, Geography 120, 121, 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, Geography 122A, 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, Geography 122B .....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. \_\_\_\_\_

## 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 and the Education Abroad Program.

## Courses in Native American Studies (NAS)

### Lower Division Courses

#### 1. Introduction to Native American Studies (4)

I. Montejo; II. Crum; III. Ross  
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.

#### 5. Introduction to Native American Literature

(4) I. The Staff; II, III. Dannenberg  
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).

#### 10. Native American Experience (4) I. Longfish; II. Macri; III. Varese

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.

#### \*32. Native American Music and Dance (4) I. The Staff

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.

#### 33. Native American Art in the U.S. (4) I. Longfish

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) II, III. Longfish

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.)

#### 46. Orientation to Research in Native American Studies (4) II. Ross

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) I. Varese

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.

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**101. Contemporary Indian Art (4) II. Longfish**  
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.

**107. Special Topics in Native American Languages** (4) II. Macri

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.

**\*112. History and Culture of the "Five Civilized Tribes"** (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people, found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in alternate years.

**115. Native Americans in the Contemporary World** (4) III. The Staff

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.

**\*116. Native American Traditional Governments** (4) II. The Staff

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) II. The Staff

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.

**\*118. Native American Politics** (4) III. The Staff  
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.

**120. Ethnopolitics of South American Indians** (4) II. Varese

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.

**122. Native American Community Development** (4) I. Varese

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.

**130A. Native American Ethno-Historical Development** (4) I. The Staff

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.

**130B. Native American Ethno-Historical Development** (4) II. Crum

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.

**130C. Native American Ethno-Historical Development** (4) III. Crum

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.

**133. Ethnohistory of Native People of Mexico and Central America** (4) I. Varese

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 economic 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.

**134. Race and Sex: Race Mixture and Mixed Peoples** (4) II. Forbes

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.

**\*156. Native American Ethics and Value Systems** (4) II. Forbes

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) I. Hernández-Ávila

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.

**180. Native American Women** (4) II. Ross

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.

**181A-181B-181C. Native American Literature** (4-4-4) I. Dannenberg; II. Montejó; III. The Staff

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.

**188. Special Topics in Native American Literary Studies** (4) I, II, III. The Staff

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.

**\*190. Seminar in Native American Studies** (2) The Staff

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) I. The Staff

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.

**194HA-194HB. Special Studies for Honors Students** (4-4) I-II. The Staff (Montejó in charge)

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) I, II, III. The Staff

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.)

**196. Senior Project in Native American Studies** (4) I, II, III. The Staff

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.)

**197TC. Community Tutoring in Native American Studies** (1-5) I, II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**200. Basic Concepts in Native American Studies** (4) III. The Staff

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.

**202. Advanced Topics in Native American Studies** (4) II. The Staff

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.

**212. Community Development for Sovereignty and Autonomy** (4) III. Varese

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.

**213. Native Criminality and "Deviance" in Native Communities** (4) I. Ross

Seminar—4 hours. Prerequisite: graduate standing. Examination of "deviance" in Native communities with focus on Native criminality in North America. Analysis of the concept of deviance from several different world views. Readings from a range of theories to incorporate varying theoretical perspective on criminality and deviance.

**\*220. Colonialism/Racism and Self-Determination** (4) III. Varese 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.

**250. Indigenous Critique of Classic Maya Ethnographies** (4) Montejo 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.

**280. Ethnohistorical Theory and Method** (4) III. Crum 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.

**298. Group Study for Graduate Students** (1-5) I, II, III. The Staff (Varese in Charge) Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

**299. Special Study for Graduate Students** (1-12) I, II, III. The Staff (Varese in Charge) Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

**Professional Course**

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Nature and Culture

(College of Letters and Science)  
 Lenora Timm, Ph.D., Program Director  
 Program Office, 522 Sproul Hall (530-752-1219)  
 World Wide Web: <http://nature.ucdavis.edu>

**Committee in Charge**

- Francisco X. Alarcón (*Spanish and Classics*)
- Michael Barbour, Ph.D. (*Environmental Horticulture*)
- Scott McLean, Ph.D. (*Comparative Literature*)
- Eldridge Moores, Ph.D. (*Geology*)
- Peter Moyle, Ph.D. (*Wildlife, Fish, and Conservation Biology*)
- Ben Orlove, Ph.D. (*Environmental Science and Policy*)
- David Robertson Ph.D. (*English*)
- Michael Smith, Ph.D. (*History*)
- Gary Snyder, Hon. Ph.D. (*English*)
- Lenora Timm, Ph.D. (*Linguistics*)
- Robert Torrance, Ph.D. (*Comparative Literature*)
- Mark Wheelis, Ph.D. (*Microbiology*)

**Faculty**

- Scott McLean, Ph.D., Lecturer (*Comparative Literature*)
- Eldridge Moores, Ph.D., Professor (*Geology*)
- Peter Moyle, Ph.D., Professor (*Wildlife, Fish and Conservation Biology*)
- David Robertson, Ph.D., Professor (*English*)
- Mark Wheelis, Ph.D., Senior Lecturer (*Microbiology*)

**The Major Program**

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        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>40-41</b> |
| Nature and Culture 1 .....                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4            |
| Chemistry 2A-2B .....                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10           |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                                                                                                                                                                                                                                                                                                                | 15           |
| Environmental Science and Policy 30 or Anthropology 2 .....                                                                                                                                                                                                                                                                                                                                                                                                                       | 3-4          |
| Comparative Literature 1, 2, or 3, or English 3 .....                                                                                                                                                                                                                                                                                                                                                                                                                             | 4            |
| Comparative Literature 20 .....                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4            |
| Recommended: Statistics 13, 32, 102, or 103.                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>44</b>    |
| Nature and Culture 100 and 180 .....                                                                                                                                                                                                                                                                                                                                                                                                                                              | 8            |
| Environmental Science and Policy 100, or Evolution and Ecology 101 or 121 .....                                                                                                                                                                                                                                                                                                                                                                                                   | 4            |
| Anthropology/Environmental Science and Policy 101 .....                                                                                                                                                                                                                                                                                                                                                                                                                           | 4            |
| Anthropology/Environmental Science and Policy 133 .....                                                                                                                                                                                                                                                                                                                                                                                                                           | 4            |
| English 184 or Native American Studies 181A, 181B, or 181C, or Comparative Literature 120 .....                                                                                                                                                                                                                                                                                                                                                                                   | 4            |
| History and Philosophy of Science 130A .....                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4            |
| Electives, a minimum of 16 units selected in consultation with an adviser from one or two thematic clusters. Possible clusters include Human Evolution and Ecology, Human Culture and Society, Indigenous Peoples, California and the Southwest, Art and Literature, Earth and Environment, The Impact of Humans on the Environment, Environmental Law, Policy and Planning. A complete list of clusters and courses is available from advisers and from the Program Office ..... | 16           |
| <b>Total units for the major</b> .....                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>84-85</b> |

**Major advisers:** S. McLean, D. Robertson, L. Timm, M. Wheelis.

**Minor Program Requirements:**

|                                                                              | UNITS     |
|------------------------------------------------------------------------------|-----------|
| <b>Nature and Culture</b> .....                                              | <b>24</b> |
| Nature and Culture 1 .....                                                   | 4         |
| Nature and Culture 100 .....                                                 | 4         |
| Environmental Science and Policy 100, Evolution and Ecology 100 or 121 ..... | 4         |
| Anthropology/Environmental Science and Policy 101 .....                      | 4         |
| Anthropology/Environmental Science and Policy 133 .....                      | 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) I. Moores, McLean  
 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.

**98. Directed Group Study** (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

**99. Individual Study** (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**\*100 The Culture of Nature: Theoretical Frameworks and Case Studies** (4) II. McLean, Wheelis  
 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 once for credit when topic and instructor differ. GE credit: SocSci, Div, Wrt.

**120. Environmental Ethics** (4) III. Timm, McLean  
 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.

**180. Fieldwork in Nature and Culture** (4) I. Moyle, Robertson  
 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.

**192. Internship in Nature and Culture** (1-12) I, II, III. The Staff (Director in charge)  
 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.)

**197T. Tutoring in Nature and Culture** (1-5) I, II, III. The Staff  
 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) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

**199. Individual Study** (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

## Nematology

(College of Agricultural and Environmental Sciences)  
Harry K. Kaya, Ph.D., Chairperson of the Department  
Department Office, 354 Hutchison Hall  
(530-752-7567/6905)

World Wide Web: <http://ucdnema.ucdavis.edu>

### Faculty

Edward P. Caswell-Chen, Ph.D., Associate Professor  
Howard Ferris, Ph.D., Professor  
Bruce A. Jaffee, Ph.D., Professor  
Harry K. Kaya, Ph.D., Professor (*Entomology*)  
Steven Nadler, Ph.D., Associate Professor  
Valerie M. Williamson, Ph.D., Professor

### Emeriti Faculty

Benjamin F. Lownsbery, Ph.D., Professor Emeritus  
Armand R. Maggenti, Ph.D., Professor Emeritus  
Dewey J. Raski, Ph.D., Professor Emeritus

### Affiliated Faculty

Becky B. Westerdahl, Ph.D., Acting Associate  
Professor

## 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, 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, Soil Science 102, 111, 112.

**Minor Adviser.** H.K. Kaya.

**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)

### Upper Division Courses

**100. General Plant Nematology** (4) I. Ferris  
Lecture—2 hours; laboratory—6 hours. Prerequisite:  
Biological Sciences 1A or 10. An introduction to the  
classification, morphology, biology, and control of the  
nematodes attacking cultivated crops.

**110. Introduction to Nematology** (2) II.

Caswell-Chen, Nadler

Lecture—2 hours. Prerequisite: Biological Sciences  
1B or the equivalent or consent of instructor. The re-  
lationship of nematodes to human environment.  
Classification, morphology, ecology, distribution, and  
importance of nematodes occurring in water and soil  
as parasites of plants and animals. GE credit: SciEng.

**199. Special Study for Advanced**

**Undergraduates** (1-5) I, II, III, summer. The Staff  
(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading  
only.)

### Graduate Courses

**201. Molecular and Physiological Plant**  
**Nematology** (2) II. Williamson

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 litera-  
ture emphasized. Offered in alternate years.

**\*202. Nematodes and the Soil Environment** (2)  
II. Jaffee

Lecture—1 hour; discussion—1 hour. Prerequisite:  
course 100 or 110, Plant Pathology 120, Soil Science  
100 or 111. Consideration of how soilborne nema-  
todes (parasites of plants and insects and microbio-  
vores) are affected by abiotic factors (especially soil  
porosity and water potential) and biotic factors (espe-  
cially fungi and bacteria that parasitize nematodes).  
Offered in alternate years.

**\*203. Ecology of Parasitic Nematodes** (2) III.  
Caswell-Chen

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 tech-  
niques, theory, and basic information about nema-  
tode-host dynamics, and application to management  
of nematode diseases. Offered in alternate years.

**204. Management of Plant-Parasitic**  
**Nematodes** (2) III. Westerdahl

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 alter-  
nate years.

**205. Insect Nematology and Biological Control**  
(2) I. Kaya

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. Appli-  
cation of ecological theory in classical and augmen-  
tative biological control. Offered in alternate years.

**206. Nematode Systematics and Evolution** (2)  
I. Nadler

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 con-  
sider patterns of character change among taxa.  
Offered in alternate years.

**245. Field Nematology** (1) I. The Staff

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.)

**290. Seminar** (1) II, III. The Staff (Chairperson in  
charge)

Seminar—1 hour. (S/U grading only.)

**290C. Advanced Research Conference** (1)  
(Research Faculty)

Discussion—1 hour. Prerequisite: graduate standing  
and consent of instructor. Planning and results of  
research programs, proposals, and experiments. Dis-  
cussion 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) I, II, III. The Staff  
(Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff  
(Chairperson in charge)

(S/U grading only.)

## Neuroscience (A Graduate Group)

David Amaral, Ph.D., Chairperson of the Group  
Group Office, 188 Briggs Hall (530-752-9091)

World Wide Web:

<http://neuroscience.ucdavis.edu/ngg>

**Faculty.** The group includes 36 faculty members from  
14 departments in the College of Agricultural and  
Environmental Sciences, College of Letters and Sci-  
ence, the Division of Biological Sciences, and the  
Schools of Medicine and of Veterinary Medicine.

**Graduate Study.** The Graduate Group in Neuro-  
science 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.** E. Carstens (*Neurobiology, Phys-  
iology and Behavior*), K. Sigvardt (*Center for Neuro-  
science*), I. Pessah (*Molecular Biosciences*).

## Courses in Neuroscience (NSC)

### Graduate Courses

**200LA. Laboratory Methods in Neurobiology**

(6) I, II, III. The Staff

Laboratory—18 hours. Prerequisite: graduate stand-  
ing in the Neuroscience Graduate Group. Individual  
research in the laboratory of a faculty member.  
Research problems emphasize the use of contempo-  
rary methods and good experimental design. May be  
repeated three times for credit. (S/U grading only.)

**200LB. Laboratory Methods in Neurobiology**

(3) I, II, III. The Staff

Laboratory—9 hours. Prerequisite: graduate stand-  
ing in the Neuroscience Graduate Group. Individual  
research in the laboratory of a faculty member.  
Research problems emphasize the use of contempo-  
rary methods and good experimental design. May be  
repeated for credit. (S/U grading only.)

**221. Cellular and Molecular Neuroscience** (4) I.  
Wilson

Lecture—3 hours; discussion—1 hour. Prerequisite:  
graduate standing or consent of instructor. Advanced  
course dealing with the cellular and subcellular or-  
ganization of the nervous system. Membrane channels,  
sensory transduction, synaptic transmission and cel-  
lular aspects of development and learning will be cov-  
ered. (Same course as Neurobiology, Physiology and  
Behavior 221.)

**222. Systems Neuroscience** (4) II. Britten

Lecture—3 hours; discussion—1 hour. Prerequisite:  
graduate standing or consent of instructor. Advanced  
course covering the integrative and information-pro-  
cessing aspects of nervous system organization. Top-  
ics 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.)

**223. Cognitive Neuroscience** (4) III. Mangun

Lecture—3 hours; discussion—1 hour. Prerequisite:  
graduate student standing in Psychology or Neuro-  
science 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.)

**243. Topics in Cellular and Behavioral**  
**Neurobiology** (2) III. Wilson

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.)



**\*250. Biology of Neuroglia** (2) III. Kumari  
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.)

**283. Neurobiological Literature** (1) I, II, III. Mulloney, Wilson  
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.)

**284. Development of Sensory Systems** (1) II, III. Chapman  
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.)

**290C. Research Conference in Neurobiology** (1) I, II, III. The Staff (Chairperson in charge)  
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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

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## Neurology

See Medicine, School of

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## Neurosurgery

See Medicine, School of

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## Nutrition

**See Community Nutrition; Dietetics; Nutrition; Nutrition (A Graduate Group); Nutrition Science; and Clinical Nutrition and Metabolism (under Internal Medicine in Medicine, School of)**

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## Nutrition

(College of Agricultural and Environmental Sciences)  
Carl L. Keen, Ph.D., Chairperson of the Department  
Department Office, 3135 Meyer Hall (530-752-4630)  
World Wide Web: <http://nutrition.ucdavis.edu>

### Faculty

Lindsay H. Allen, Ph.D., Professor  
Kenneth H. Brown, M.D., Professor  
Andrew J. Clifford, Ph.D., Professor  
Kathryn G. Dewey, Ph.D., Professor  
Louis E. Grivetti, Ph.D., Professor (*Nutrition, Geography*)  
Carl L. Keen, Ph.D., Professor (*Nutrition, Internal Medicine*)

Bo L. Lonnerdal, Ph.D., Professor (*Nutrition, Internal Medicine*)  
Roger McDonald, Ph.D., Professor  
Robert B. Rucker, Ph.D., Professor (*Nutrition, Biological Chemistry*)  
Michael A. Satre, Ph.D., Assistant Professor  
Barbara O. Schneeman, Ph.D., Professor (*Nutrition, Food Science and Technology, Internal Medicine*)  
Francene M. Steinberg, Ph.D., R.D., Assistant Professor  
Judith S. Stern, Sc.D., Professor (*Nutrition, Internal Medicine*)

### Emeriti Faculty

Fredric W. Hill, Ph.D., Professor Emeritus  
William C. Weir, Ph.D., Professor Emeritus  
Frances J. Zeman, Ph.D., Professor Emeritus

### Affiliated Faculty

Elizabeth A. Applegate, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*  
Suzanne Murphy, Ph.D., R.D., EFNEP Program Administrator  
Jo Ann Prophet, M.S., Lecturer  
Janet Uriu-Hare, Assistant Research Nutritionist  
Sheri Zidenberg-Cherr, Ph.D., Nutrition Science Specialist

**Major Programs.** See the majors in Community Nutrition, Dietetics, and Nutrition Science.

### 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.

|                                                                                 | UNITS     |
|---------------------------------------------------------------------------------|-----------|
| <b>Community Nutrition</b> .....                                                | <b>24</b> |
| Preparation: plan in advance to include the required course prerequisites.      |           |
| Nutrition 101 and 111 .....                                                     | 9         |
| Nutrition 118, 192 (2) .....                                                    | 6         |
| Nutrition 120A or 120B .....                                                    | 4         |
| Neurobiology, Physiology and Behavior 101 .....                                 | 5         |
| Replacement courses (see note above):<br>Nutrition 114, 116A-116B, 116AL-116BL. |           |

|                                                                                                   | UNITS        |
|---------------------------------------------------------------------------------------------------|--------------|
| <b>Food Service Management</b> .....                                                              | <b>24-25</b> |
| 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):<br>Nutrition 10, 101, 111, 114, 116A-116B, Economics 1A-1B. |              |

|                                                                                 | UNITS     |
|---------------------------------------------------------------------------------|-----------|
| <b>Nutrition and Food</b> .....                                                 | <b>24</b> |
| Preparation: plan in advance to include the required course prerequisites.      |           |
| Nutrition 101, 111 .....                                                        | 9         |
| Nutrition 120A or 120B .....                                                    | 4         |
| Food Science and Technology 100A, 100B ...                                      | 6         |
| Neurobiology, Physiology and Behavior 101 .....                                 | 5         |
| Replacement courses (see note above):<br>Nutrition 114, 116A-116B, 116AL-116BL. |           |

|                                                                                        | UNITS     |
|----------------------------------------------------------------------------------------|-----------|
| <b>Nutrition Science</b> .....                                                         | <b>20</b> |
| Preparation: plan in advance to include the required course prerequisites.             |           |
| Animal Biology 102 and 103, or Biological Sciences 102 and 103 and Nutrition 101 ..... | 8-11      |

|                                                                                                                     |   |
|---------------------------------------------------------------------------------------------------------------------|---|
| Neurobiology, Physiology and Behavior 101 .....                                                                     | 5 |
| Nutrition 111 .....                                                                                                 | 4 |
| Replacement courses (see note above):<br>Nutrition 114, 115, 116A-116B, 117, 120A or 120B, 122, 123, 124, 201, 204. |   |

**Minor Adviser.** R.B. Rucker.

**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) I, II, III. Applegate  
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.

**11. Current Topics and Controversies in Nutrition** (2) I, II, III. Applegate  
Discussion—1.5 hours; oral reports, written reports, term paper. Prerequisite: course 10 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary nutrition. Coordinated with course 10. Not open for credit to students who have taken an upper division course in nutrition. GE credit: SciEng, Wrt.

**20. Food and Culture: An Introduction to Culture, Diet, and Cuisine** (4) II. Grivetti  
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2, and course 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits; origins and development of dietary practices. GE credit: SciEng or SocSci.

**99. Individual Study for Undergraduates** (1-5) I, II, III. The Staff  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**101. Introduction to Nutrition and Metabolism** (5) I. Lonnerdal  
Lecture—4 hours; independent study—1 hour. Prerequisite: Chemistry 8B; Neurobiology, Physiology and Behavior 101 or the equivalent. Introduction to the 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. Diet project. Not open for credit to students who have taken course 110 or 111.

**\*110. Principles of Nutrition** (5) II. Calvert (Animal Science) and Rucker (Nutrition)  
Lecture—5 hours. Prerequisite: Biological Sciences 103; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. Physiological basis of nutrient requirements for growth, maintenance and production. Physiological basis of nutritional disorders. GE credit: Div.

**111. Human Nutrition** (4) III. McDonald  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of nutrient requirements at various phases of life cycle.

**112. Nutritional Assessment** (3) III. Staff  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101 or 110, and 111 (may be taken concurrently). Methods of human nutritional assessment, including dietary, anthropometric, biochemical and hematological techniques as well as physical examination. Principles of precision, accuracy and interpretation of results for individuals and populations.

**114. Developmental Nutrition** (4) II. Keen, Satre  
Lecture—4 hours. Prerequisite: course 110 or 101; course 111. Role of nutritional factors in embryonic and postnatal development. GE credit: SciEng, Wrt.

**115. Animal Feeds and Nutrition** (4) II. DePeters (Animal Science)

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.

**116A-116B. Clinical Nutrition** (3-3) I-II. The Staff  
Lecture—3 hours. Prerequisite: courses 110, 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.

**116AL. Clinical Nutrition Practicum** (3) I. Steinberg

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.

**116BL. Clinical Nutrition Practicum** (3) II. Steinberg

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.

**117. Experimental Nutrition** (6) I. Clifford

Lecture—3 hours; laboratory—6 hours; extensive writing. Prerequisite: courses 110, 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.

**118. Community Nutrition** (4) II. Dewey

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.

**\*120A. Nutritional Anthropology** (4) I. Grivetti  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10, Anthropology 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. Offered in alternate years. GE credit: SciEng or SocSci, Div.

**120B. Nutritional Geography** (4) I. Grivetti

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10; 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. Offered in alternate years. GE credit: SciEng or SocSci, Div.

**122. Ruminant Nutrition and Digestive Physiology** (4) III. Fadel

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing; Biological Sciences 102 and 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.

**123. Companion and Captive Animal Nutrition** (4) III. Klasing

Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: course 110; Biological Sciences 102 and 103. Comparative nutrition of non-ruminant vertebrate animals; including laboratory and companion animals, primates and wildlife. Relation of nutrition to metabolic adaptations and physiological state. Discussion/laboratory exercises leading to written group reports on establishment of nutritional requirements

and formulating complete diets. GE credit: SciEng, Wrt.

**124. Nutrition and Feeding of Finfishes** (3) III. Hung (Animal Science)

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.

**129. Journalistic Practicum in Nutrition** (3) III. Stern

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 once for credit.

**130. Experiments in Nutrition: Design and Execution** (2) I, II, III. The Staff (Keen in charge)

Laboratory—6 hours. Prerequisite: consent of instructor; course 101, 110, 111, or 114 recommended. Experiments in current nutritional problems, Discussion of experimental design. Students choose a project, and, independently or in groups of 2-3, design a protocol, do the project and report their findings. May be repeated for credit with consent of instructor.

**190. Proseminar in Nutrition** (1) I, II, III. Zidenberg-Cherr

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.

**190C. Nutrition Research Conference** (1) I, II, III. The Staff (Keen in charge)

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.)

**192. Internship** (1-12) I, II, III. The Staff

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) I, II, III. The Staff  
Discussion/laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Dietetics, Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. 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) I, II, III.

The Staff (Keen in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Keen in charge)

(P/NP grading only.)

**Graduate Courses****201. Vitamin Metabolism** (2) II. Rucker

Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry 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 emphasized.

**202. Advanced Nutritional Energetics** (2) I. Baldwin

Lecture—2 hours. Prerequisite: course 110, Biological Sciences 103, Physiology 110 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.

**203. Advanced Protein and Amino Acid Nutrition** (2) III. The Staff (Rogers, Molecular Biosciences, in charge)

Lecture—2 hours. Prerequisite: course 110, Biological Sciences 103, Physiology 110 or the equivalent. 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.

**204. Mineral Metabolism** (2) III. Lonnerdal, Keen  
Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metabolic functions and nutritional interrelationships involving minerals.

**\*216. Advanced Diet Therapy** (3) III. The Staff  
Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

**\*218. Advanced Field Work in Community Nutrition** (2-12) I, II, III, extra session summer. The Staff

Discussion—1 hour; fieldwork. Prerequisite: courses 118, 119; graduate standing; consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

**219A. International Nutrition** (3) II. Brown, Dewey, Pollitt (Pediatrics)

Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Epidemiology, etiology, and consequences of under-nutrition in developing countries. Offered in alternate years.

**219B. International Nutrition** (3) III. Brown, Dewey, Pollitt (Pediatrics)

Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Nutrition policies and programs in developing countries. Offered in alternate years.

**230. Experiments in Nutrition: Design and Execution** (2) I, II, III. The Staff (Chairperson in charge)

Laboratory—6 hours. Prerequisite: consent of instructor; course 201, 202, 203, 204 or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently or in groups of 2-3 students design a protocol, carry out the project, analyze the results and report their findings. May be repeated an additional two times for credit for a different project under the guidance of another faculty member.

**252. Nutrition and Development** (3) II. Keen, Satre

Lecture—3 hours. Prerequisite: courses 201, 202, 203, 204. Relationship of nutrition to prenatal and early postnatal development.

**\*253. Control of Food Intake** (3) III. Stern (Nutrition), Gietzen (Anatomy, Physiology and Cell Biology) and staff

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) I. Baldwin (Animal Science)

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.

**\*255. Nutritional Toxicology (3) I.** The Staff  
Lecture/discussion—3 hours. Prerequisite: course 110 or the equivalent, courses 201 and 204; Physiological Sciences 205B recommended. Examines naturally occurring toxicants in human food and animal feeds. Toxic nutrients, anti-nutrients, secondary plant compounds and mycotoxin metabolism are emphasized.

**256. Nutritional and Hormonal Control of Animal Metabolic Function (3) III.** Baldwin (Animal Science)  
Lecture—3 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A-205B. Significance and interpretation of enzyme, metabolite, in vitro and in vivo isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid, and lipid metabolism will be discussed. Offered in alternate years.

**\*257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2) I.** Klasing (Avian Sciences), Calvert (Animal Science)  
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.

**\*258. Field Research Methods in International Nutrition (3) II.** Brown, Dewey, Pollitt (Pediatrics)  
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.

**\*259. Nutrition and Aging (2) I.** McDonald  
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.

**290. Beginning Nutrition Seminar (2) I, II.** Satre  
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.

**290C. Research Conference (1) I, II, III.** The Staff (Keen in charge)  
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.)

**291. Advanced Nutrition Seminar (1) I, II, III.** The Staff (Keen in charge)  
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.)

**293A. Current Topics in Obesity, Food Intake and Energy Balance (3) I.** Stern  
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 profession-

als. May be repeated for credit with consent of instructor.

**293B. Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3) II.** Stern  
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.

**297T. Supervised Teaching in Nutrition (1-3) I, II, III.** The Staff (Keen in charge)  
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) I, II, III.** The Staff (Keen in charge)

**299. Research (1-12) I, II, III.** The Staff (Keen in charge)  
(S/U grading only.)

**Professional Course**

**\*380. Supervised Teaching in Dietetics (2-12) I, II, III, extra-session summer.** The Staff  
Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietetics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

**Professional Course**

**492A. Professionalism: An Academic Perspective (2) I.** Grivetti  
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.

**492B. Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3) III.** Stern  
Lecture—1 hour; seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing in Nutrition or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Students will present case studies in areas such as fraud, scientific integrity, misconduct and conflict of interest. Offered in alternate years.

**\*492C. Grant Writing (3) III.** Stern  
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 once for credit with consent of instructor. Offered in alternate years.

## Nutrition (A Graduate Group)

Kathryn G. Dewey, Ph.D., Chairperson of the Group  
Group Office, 3135 Meyer Hall (530-752-4630)  
World Wide Web: <http://nutrition.ucdavis.edu>

**Faculty.** Faculty are drawn from the Colleges of Agricultural and Environmental Sciences, and of Letters and Science, and the Schools of Medicine and of Veterinary Medicine.

**Graduate Study.** The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees. Research activities in nutrition include work with humans and with laboratory, domestic, and wild animals. Areas of specialization

include the effect of diet on energetics and intermediary metabolism; nutrient control of gene expression, community nutrition, ruminant nutrition, amino acid requirements and utilization; nutrient balance and food intake regulation; biological antioxidants; food toxicants; mineral and vitamin nutrition; various anomalies of pre- and postnatal development; parenteral nutrition; the application of biomathematics to nutritional analyses; human and animal dietetics; and international nutrition. For detailed information regarding these programs, address the chairperson of the group.

**Graduate Advisers.** Consult the Nutrition Graduate Group Office.

## Nutrition Science

(College of Agricultural and Environmental Sciences)

### The Major Program

The study of nutrition encompasses all aspects of the collection, preparation, and consumption of food. Also important in the study of nutrition are the biochemical reactions that take place within the body's cells to utilize these nutrients. This is the level at which the nutrition science major explores the general subject of nutrition.

**The Program.** While students may elect to take courses concerning the social, psychological, economic, or cultural aspects of nutrition, the bulk of the course work making up the major consists of courses in the natural sciences. Nutrition as it is taught on the Davis campus is a biological science and requires a complete background in chemistry and biology, along with physics and calculus. These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. Nutrition science students go on to study nutrition in depth during their junior and senior years.

**Career Alternatives.** The nutrition science major is excellent preparation for technical work in nutrition in animal, food, and pharmaceutical industries. It also provides a strong background for technical writing or health education. Students who wish to continue their studies are well prepared for professional study in nutrition, dietetics, medicine, and other health sciences.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

|                                                                                                             |              |
|-------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                             | UNITS        |
| <b>English Composition Requirement</b> .....                                                                | <b>0-8</b>   |
| See College requirement                                                                                     |              |
| <b>Preparatory Subject Matter</b> .....                                                                     | <b>55-58</b> |
| Biological sciences (Biological Sciences 1A, 1B, 1C).....                                                   | 15           |
| Chemistry (Chemistry 2A-2B-2C; and 8A-8B or 118A-118B or 128A-128B and 129A).....                           | 21-23        |
| Computer science (Computer Science Engineering 10 or 15 or Agricultural Systems and Environment 21).....    | 3-4          |
| Mathematics (Mathematics 16A-16B).....                                                                      | 6            |
| Physics (Physics 1A-1B).....                                                                                | 6            |
| Statistics (Statistics 13 or Agricultural Systems and Environment 120).....                                 | 4            |
| <b>Breadth/General Education</b> .....                                                                      | <b>24</b>    |
| Satisfaction of General Education requirement plus additional course work in social sciences and humanities |              |
| <b>Depth Subject Matter</b> .....                                                                           | <b>24-26</b> |
| Biochemistry and nutrition (Animal Biology 102, 103).....                                                   | 8            |
| Nutrition 111, 117.....                                                                                     | 10           |



Nutrition courses selected from 112, 114, 115, 116A, 116B, 122, 123, 130, 190, 190C, 198, and 199 .....6-8

**Restricted Electives .....42**

Biochemistry laboratory (Molecular and Cellular Biology 120L) .....6  
 Food science (upper division courses) .....6  
 Physiology with laboratory (Neurobiology, Physiology and Behavior 101, 101L, plus an additional physiology course) .....10  
 Additional nutrition or related biological and physical sciences .....20

**Unrestricted Electives .....22-35**

**Total Units for the Degree .....180**

**Major Adviser.** B. L. Lonnerdal.

**Advising Center** for the major is located in 1202E 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 1 or 3, Psychology 1, Communication 1, Sociology 1 or 3 or Anthropology 2, Economics 1A or 1B, Food Science and Technology 100A, 100B, 101A, 101B, 108, Nutrition 111, 112, 116A, 116B, 116AL-BL, 118, 190. The following courses must be added: Agricultural and Resource Economics 112; Community and Regional Development 173 or Education 110; Food Service Management 120, 120L, 122; Microbiology 102, 102L or Food Science 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 the Graduate Studies chapter of this catalog.

## Obstetrics and Gynecology

See Medicine, School of

## Ophthalmology

See Medicine, School of

## Organizational Studies

See Sociology

## Orientation

(College of Agricultural and Environmental Sciences)

### Course in Orientation (ORI)

Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

#### Lower Division Course

**\*1. Orientation** (no credit) I, II, III. Chaykin (Biochemistry and Biophysics)  
 Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (P/INP grading only.)

## Orthopaedic Surgery

See Medicine, School of

## Otolaryngology

See Medicine, School of

## Parks and Recreation

See Community and Regional Development; Design; Environmental Planning and Management (under Environmental Horticulture); Landscape Architecture; and Physical Education (under Exercise Science)

## Pathology

See Pathology (Medicine, School of); Pathology, Microbiology and Immunology; and Plant Pathology

## Pathology, Microbiology, and Immunology

(School of Veterinary Medicine)

N. James MacLachlan, B.V.Sc., Ph.D., Chairperson of the Department

Department Office, 1044 Haring Hall (530-752-1385)

World Wide Web: <http://www.vetmed.ucdavis.edu/pmi/pmipage1.htm>

#### Faculty

Mark L. Anderson, D.V.M., Ph.D., Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Bradd C. Barr, D.V.M., Ph.D., Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Stephen W. Barthold, D.V.M., Ph.D., Professor

Arthur A. Bickford, V.M.D., Ph.D., Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Walter M. Boyce, D.V.M., Ph.D., Associate Professor  
 Mary M. Christopher, D.V.M., Ph.D., Associate Professor

Pat A. Conrad, D.V.M., Ph.D., Professor  
 George Cooper, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Microbiology (*California Veterinary Diagnostic Laboratory*)

Barbara Daft, D.V.M., Assistant Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Laurel J. Gershwin, D.V.M., Ph.D., Professor  
 Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor

Dwight C. Hirsh, D.V.M., Ph.D., Professor, *Academic Senate Distinguished Teaching Award*

Bill Johnson, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Hailu Kinde, D.V.M., M.P.V.M., Assistant Professor of Clinical Diagnostic Microbiology (*California Veterinary Diagnostic Laboratory*)

Rance B. LeFebvre, Ph.D., Professor

Linda J. Lowenstine, D.V.M., Ph.D., Professor

N. James MacLachlan, B.V.Sc., Ph.D., Professor

F. Charles Mohr, D.V.M., Ph.D., Associate Professor

Peter F. Moore, B.V.Sc., Ph.D., Professor

Linda Munson, D.V.M., Ph.D., Associate Professor

Frederick A. Murphy, D.V.M., Ph.D., Professor

Bennie I. Osburn, D.V.M., Ph.D., Dean

Deryck H. Read, B.V.Sc., Ph.D., Associate Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

H. L. Shivaprasad, M.S., B.V.Sc., Ph.D., Associate Professor of Clinical Diagnostic Pathology (*California Veterinary Diagnostic Laboratory*)

Jeffrey L. Stott, Ph.D., Professor

Richard L. Walker, D.V.M., M.P.V.M., Ph.D., Associate Professor (*California Veterinary Diagnostic Laboratory*)

Dennis W. Wilson, D.V.M., M.S., Ph.D., Professor

Leslie Woods, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Radiology (*California Veterinary Diagnostic Laboratory*)

Tilahun Yilma, D.V.M., Ph.D., Professor

Yuan Chung Zee, D.V.M., Ph.D., Professor

Joseph G. Zinkl, D.V.M., Ph.D., Professor

#### Emeriti Faculty

Norman F. Baker, D.V.M., Ph.D., Professor Emeritus

Ernst L. Biberstein, D.V.M., Ph.D., Professor Emeritus

Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus

Donald L. Dungworth, B.V.Sc., Ph.D., Professor Emeritus

Bernard F. Feldman, D.V.M., Ph.D., Professor Emeritus

Nemi C. Jain, M.V.Sc., Ph.D., Professor Emeritus

Donald E. Jasper, D.V.M., Ph.D., Professor Emeritus

Jiro K. Kaneko, D.V.M., Ph.D., D.V.Sc. (hc), Professor Emeritus

Peter C. Kennedy, D.V.M., Ph.D., Professor Emeritus

Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus

Harvey J. Olander, D.V.M., Ph.D., Professor Emeritus

John W. Osebold, D.V.M., Ph.D., Professor Emeritus

Roy R. Pool, Jr., D.V.M., Professor Emeritus

Ming Ming Wong, Ph.D., Professor Emeritus

#### Affiliated Faculty

David A. Ferrick, Ph.D., Associate Adjunct Professor

Jeanne M. George, D.V.M., Lecturer

Laura D. Kramer, Ph.D., Associate Researcher (*Center for Vector-Borne Disease*)

Hugh D. Lothrop, B.S., Associate Specialist (*Coachella Valley Mosquito Abatement District-Thermal*)

Carol P. Mandell, D.V.M., Ph.D., Lecturer

Marta Marthas, Ph.D., Assistant Adjunct Professor (*California Primate Research Center*)

Christopher J. Miller, D.V.M., Ph.D., Associate Adjunct Professor, Pathology (*California Primate Research Center*)

William K. Reisen, Ph.D., Research Entomologist (*Arbovirus Field Station, Bakersfield*)

## Courses in Pathology, Microbiology, and Immunology (PMI)

### Lower Division Course

**99. Special Study for Undergraduates** (1-5) I, II, III. Staff

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**\*101. Comparative Hematology** (2) III. Zinkl

Lecture—2 hours. Prerequisite: Biological Sciences 1A, Physiology 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

**\*101L. Comparative Hematology Laboratory** (2) III. Zinkl

Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

**\*102. Clinical Biochemistry** (3) II. Zinkl

Lecture—3 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or Biochemistry and Biophysics 101A-101B or consent of instructor. Principles of biochemistry as related to alterations in the biochemical constituents of blood, urine and other body fluids.

**126. Fundamentals of Immunology** (3) I. Stott, Gershwin

Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

**126L. Immunology Laboratory** (2) I. Stott

Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

**127. Medical Bacteria and Fungi** (5) III. LeFebvre

Lecture—3 hours; laboratory—5 hours. Prerequisite: general microbiology (Microbiology 102 and 102L), basic immunology (course 126 or Medical Microbiology 107). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease.

**128. Biology of Animal Viruses** (3) I. Zee

Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. 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.

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Gershwin in charge)

(P/NP grading only.)

### Graduate Courses

**\*204. Normal and Abnormal Bone Marrow**

**Cytology** (1) III. Zinkl

Lecture-laboratory—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

**270. Advanced Immunology** (3) III. Stott

Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement. Biology of lymphocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunochemistry and immunobiology. Offered in alternate years.

**283. Comparative Avian Anatomy and Pathology** (1-3) I. Lowenstine

Lecture—3 hours. Prerequisite: anatomy section—upper division undergraduates, graduates, and veterinary students; pathology section—third-year and fourth-year veterinary students and graduate students. Ten lectures outline gross/microscopic anatomy of a wide range of avian species as appropriate for students interested in avian biology. Twenty lectures encompass comparative aspects of avian pathology and disease manifestations for students interested in avian diseases. Offered in alternate years.

**\*285. Cellular Basis of Disease** (3) II. Mohr, Wu

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B, Biological Sciences 104, and either Veterinary Medicine 452 or Medical Pathology 210. The disciplines of cell biology, biochemistry and molecular biology will be applied to the understanding of the basic nature of disease. Covers cellular injury and mechanisms of adaptation, host-defense and vascular responses, and cellular transformation. Offered in alternate years.

**\*287. Comparative Pathology of Laboratory**

**Animals** (3) III. Lowenstine

Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor in charge. The pathology of diseases of animals commonly kept in laboratory settings including cold-blooded vertebrates as well as rodents, lagomorphs, and non-human primates. Emphases will be recognition of lesions and understanding of pathogenesis. Offered in alternate years.

**290. Seminar** (1) I, II, III. The Staff

Seminar—1 hour. (S/U grading only.)

**291A. Seminar in Immunology** (1) I, II, III.

Gershwin

Seminar—1 hour. A discussion of the current topics in immunology. May be repeated for credit. (S/U grading only.)

**291B. Histopathology Conference** (1) I, II, III.

The Staff (Wilson in charge)

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. May be repeated for credit. (S/U grading only.)

**292A. Seminar in Animal Virology** (1) I, II, III.

Marthas, Miller

Seminar—1 hour. A discussion of the current topics in animal virology. May be repeated for credit. (Same course as Microbiology 296.) (S/U grading only.)

**292B. Surgical Pathology Conference** (1) I, II,

III. The Staff (Wilson in charge)

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; 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.)

**293A. Seminar in Infectious Diseases** (1) I, II,

III. Hirsh

Seminar—1 hour. Discussion of current topics and cases of infectious diseases. May be repeated for credit. (S/U grading only.)

**293B. Necropsy and Surgical Pathology** (1-4) I, II, III. The Staff (Wilson in charge)

Discussion—1 hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. May be repeated for credit. (S/U grading only.)

**\*294A. Comparative Pathology Conference** (1)

I, II, III. Lowenstine

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in comparative pathology based on currently available case materials from fish, laboratory animals, zoo and wild animals and non-human primates. Given jointly by the Departments of Pathology in the Medical and Veterinary Schools and the California Primate Research Center. (S/U grading only.)

**296. Microbiological Diagnosis** (2-5) I, II, III.

Gershwin, Hirsh

Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrently); 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.)

**298. Group Study** (1-5) I, II, III. The Staff

Group study of advanced topics in pathology. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff

(S/U grading only.)

### Professional Course

**397T. Tutoring in Veterinary Pathology, Microbiology, and Immunology** (1-5) I, II, III. The Staff

Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

### Professional Courses

**418. Diseases of Free-Living Wildlife** (2) III.

Boyce

Discussion—20 hours. Prerequisite: first-, second-, or third-year standing in School of Veterinary Medicine or consent of instructor. Ecology and epidemiology of disease in free-living wild animals, including medical management of free-living populations.

**\*418L. Diseases of Free-Living Wildlife**

**Laboratory** (3) III. The Staff

Lecture—1 hour; laboratory—90 hours total. Prerequisite: third-year standing in School of Veterinary Medicine and course 418. Field course designed to develop problem solving skills for field and laboratory assessments of wildlife health and related environment; learn and perform technical aspects of wildlife restraint; develop skills necessary to approach field studies.

## Pediatrics

See Medicine, School of

## Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (under Medicine, School of); Molecular Biosciences (Veterinary Medicine); and Pharmacology and Toxicology (A Graduate Group)

## Pharmacology and Toxicology (A Graduate Group)

Jerold A. Last, Ph.D., Chairperson of the Group  
Group Office, 4138 Meyer Hall (Department of  
Environmental Toxicology, 530-752-4516)

World Wide Web: <http://etx.ucdavis.edu/ptx>

**Faculty.** The 47 faculty in the graduate group are from more than 20 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 (students are admitted for the M.S. degree only under unusual and limited circumstances). 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.

**Graduate Advisers.** C.G. Plopper (*Anatomy, Physiology and Cell Biology*), A.R. Buckpitt (*Molecular Biosciences*), J.A. Last (*Pulmonary Medicine*), M.G. Miller (*Environmental Toxicology*).

### Courses in Pharmacology and Toxicology (PTX)

#### Graduate Courses

##### 201. Principles of Pharmacology and Toxicology I (5) I. Buckpitt (Molecular Biosciences)

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 chemical in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically.

##### 202. Principles of Pharmacology and Toxicology II (5) II. Pessah

Lecture—5 hours. Prerequisite: course 201. The second of three courses presenting fundamental principles of pharmacology and toxicology. Covers the principles of pharmacodynamics and mechanisms of drug/toxicant actions.

##### 203. Principles of Pharmacology and Toxicology III (3) III. Miller

Lecture—3 hours. Prerequisite: course 202. Physiologic pharmacology and toxicology, focusing on integrated physiological systems: the nervous system, cardiovascular system, immune system and reproductive system.

##### 230. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff

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.

**290. Seminar (1) I, II, III. The Staff**  
Current topics in pharmacology and toxicology. (S/U grading only.)

## Philosophy

(College of Letters and Science)

Jeffrey C. King, Ph.D., Chairperson of the Department

Department Office, 1238 Social Sciences and Humanities Building (530-752-0607)

World Wide Web: <http://www-philosophy.ucdavis.edu>

#### Faculty

David I. Copp, Ph.D., Professor  
Robert C. Cummins, Ph.D., Professor  
James R. Griesemer, Ph.D., Professor  
Gerald Dworkin, Ph.D., Professor  
Michael Jubien, Ph.D., Professor  
Jeffrey King, Ph.D., Associate Professor  
George J. Matthey II, Ph.D., Lecturer  
Connie S. Rosati, Ph.D., Assistant Professor  
Paul Teller, Ph.D., Professor  
Michael V. Wedin, Ph.D., Professor

#### Emeriti Faculty

Ronald A. Arbini, Ph.D., Professor Emeritus  
William H. Bossart, Ph.D., Professor Emeritus  
Joel I. Friedman, Ph.D., Professor Emeritus  
Neal W. Gilbert, Ph.D., Professor Emeritus  
Marjorie Grene, Ph.D., Professor Emeritus  
John F. Malcolm, 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 natural, 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

Three of the following: Philosophy 1, 13, 14 or 24, 21, 22, 23, 31 or 32, 101, 102...12  
Philosophy 12.....4

#### Depth Subject Matter .....36

Upper division units in Philosophy selected with approval from the major adviser...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. Matthey.

### 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, subject to the approval of the minor adviser. The range of choice in the logic specialization is limited to the courses listed.

UNITS

#### Philosophy—General.....20

Twenty upper division units in philosophy, chosen in consultation with the minor adviser. At most, 4 units may be lower division if the student has taken two lower division philosophy courses, one of which is drawn from the following: Philosophy 12, 21, 22, 23.

#### Philosophy—Logic.....20

Philosophy 12 or Mathematics 108 .....4  
Philosophy 112.....4  
Select units from Philosophy 113, 131, 132, 133, 134, 135 .....12

**Minor Adviser.** G.J. Matthey.

**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:

(i) *pre-law*: 12, 14, 24, 102, 104, 112, 115, 116, 118 and, especially, 119; (ii) *pre-medical*: 14, 104, 108, 114, 115, 116; (iii) *business*: 14, 102, 112, 114, 115, 116, 117, 118, 119; (iv) *social policy*: 14, 24, 101, 102, 114, 115, 116, 117, 118, 119; (v) *social sciences*: 12, 31, 32, 101, 102, 103, 104, 109, 118, 131; (vi) *physical sciences*: 12, 31, 32, 101, 102, 104, 106, 107, 112, 131; (vii) *biological sciences*: 31, 32, 101, 102, 104, 108, 110; (viii) *humanities and the arts*: 14, 21 through 24, 101, 102, 103, 105, 114, 116, 118, 123, 160 through 175; (ix) *agricultural and Environmental Science and Policy*: 5, 14, 24, 31, 104, 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. In association with the Program on Economy, Justice and Society, the department also offers the Ph.D. in Philosophy with designated emphasis in Economy, Justice and Society. Detailed



information may be obtained by writing to the Graduate Adviser.

**Graduate Adviser.** D. Copp.

## Courses in Philosophy (PHI)

### Lower Division Courses

**1. Introduction to Philosophy** (4) I. Cummins; II, III. The Staff

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.

**5. Critical Reasoning** (4) II. The Staff

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.

**\*6. Critical Reasoning and Writing** (4) III.

The Staff

Lecture—3 hours; discussion—1 hour. Topics to be covered may include criteria of good reasoning in everyday life and in science; basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Critical papers emphasized. Not open to students who have completed course 5. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*11. Philosophy East and West** (4) II. Friedman

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. Offered in alternate years. (Former course 10E.) GE credit: ArtHum, Div, Wrt.

**12. Introduction to Symbolic Logic** (4) I. Teller

Lecture—3 hours; discussion—1 hour. Sentence logic syntax and semantics. Truth tables. Transcription between sentence logic and English. Logical equivalence. Validity. Proof techniques.

**\*13. The Person** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, e.g., that persons are agents, that they have a distinct psychology, that they are rational, that they are language-users, that they are mortal. GE credit: ArtHum, Wrt.

**14. Ethical and Social Problems in Contemporary Society** (4) I. The Staff

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. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**15. Bioethics** (4) III. Dworkin

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. Offered in alternate years. GE credit: ArtHum, Wrt.

**21. History of Philosophy: Ancient** (4) I. Wedin  
Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. GE credit: ArtHum, Wrt.

**22. History of Philosophy: Seventeenth Century** (4) II. Matthey

Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz and seventeenth century scientific thinkers. GE credit: ArtHum, Wrt.

**23. History of Philosophy: Eighteenth Century** (4) III. Matthey

Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. GE credit: ArtHum, Wrt.

**\*24. Introduction to Ethics and Political**

**Philosophy** (4) III. The Staff

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.

**\*31. Appraising Scientific Reasoning** (4) I.

Griesemer

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.

**\*32. Understanding Scientific Change** (4) II.

Griesemer

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.

**\*90X. Lower Division Seminar in Philosophy**

(1-2) I, II, III. The Staff

Seminar—1-2 hours. Prerequisite: completion of fewer than 84 quarter units; completion of at least one course in philosophy; consent of instructor. Investigation of a selected topic in philosophy through readings, discussions, and written assignments. Emphasis upon student participation. Limited enrollment.

**\*98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

*(Certain upper division courses may not be offered every year.)*

**101. Metaphysics** (4) I. Jubien

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.

**102. Theory of Knowledge** (4) I. Matthey

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.

**\*103. Philosophy of Mind** (4) III. The Staff

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.

**104. Introduction to Philosophy of Science** (4) II. Teller

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or a science background recommended. 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. GE credit: ArtHum or SciEng, Wrt.

**\*105. Philosophy of Religion** (4) II. The Staff  
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.

**\*106. Science and Metaphysics** (4) I. The Staff  
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or consent of instructor. Intensive study of topics in metaphysics to which the results of modern science are or appear to be relevant: the nature of time, causation, determinism, physicalism, realism. GE credit: ArtHum or SciEng, Wrt.

**\*107. Philosophy of the Physical Sciences** (4) I. Teller

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, determinism, induction, and probability; the structure of scientific revolutions. GE credit: ArtHum or SciEng, Wrt.

**\*108. Philosophy of the Biological Sciences** (4) I. Griesemer

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.

**109. Philosophy of the Social Sciences** (4) I.

Teller

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. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.

**\*110. An Historical Introduction to the**

**Philosophy of Science** (4) The Staff

Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the development of the natural sciences. Impact of these scientific developments on philosophical thought of the immediately following historical period. GE credit: ArtHum or SciEng, Wrt.

**\*111. Philosophy of Space and Time** (4) Teller

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.

**112. Intermediate Symbolic Logic** (4) II. Matthey  
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.

**113. Advanced Logic** (4) III. Jubien

Lecture/discussion—4 hours. Prerequisite: course 112 or Mathematics 108 or the equivalent. Topics will vary between metalogic of First-Order logic through the Completeness and Löwenheim-Skolem theorems; and Zermelo-Fraenkel set theory typically axiomatized as a First-Order theory. May be repeated once when subject area differs.

**\*114. History of Ethics** (4) II. The Staff

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 concen-

trated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: ArtHum, Wrt.

**\*115. Problems in Normative Ethics (4) II.** The Staff

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.

**116. Ethical Theories (4) III.** Copp  
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.

**117. Foundations of Ethics (4) I.** Copp  
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.

**\*118. Political Philosophy (4) The Staff**  
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. (Former course 117.) Not open for credit to students who have completed former course 117. Offered in alternate years. GE credit: SocSci, Div, Wrt.

**119. Philosophy of Law (4) I.** Copp  
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. (Former course 116.) GE credit: SocSci, Div, Wrt.

**121. Topics in Metaphysics (4) II.** Jubien  
Lecture/discussion—4 hours. Prerequisite: course 101. Examination of up to three topics in metaphysics, e.g., fatalism; necessity; identity; ontological categories; minds, bodies, and persons; space and time; freedom and determinism.

**122. Topics in Theory of Knowledge (4) III.** Matthey  
Lecture/discussion—4 hours. Prerequisite: course 102. Examination of one or more topics in theory of knowledge, such as belief, skepticism, justification.

**\*123. Aesthetics (4) The Staff**  
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.

**\*127. Philosophy and Economics (4) The Staff**  
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division course in philosophy. Study of issues at the intersection of economics and moral and political philosophy, e.g., the nature of value, the nature of justice, the nature of rationality, the measurability of human well-being. GE credit: ArtHum or SocSci, Wrt.

**\*131. Philosophy of Logic and Mathematics (4) Jubien**  
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 the-

ory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results.

**\*132. History of Logic (4) The Staff**  
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or logic recommended. Overview of the chief developments in the history of logic.

**\*133. Topics in Mathematical Logic (4) III.** King  
Lecture/discussion—4 hours. Prerequisite: course 113 or Mathematics 125 or consent of instructor. Topics to be taken typically from the following: metalogic and model theory; axiomatic set theory and independence results; Gödel's incompleteness theorems; computability and recursion theory.

**\*134. Modal Logic (4) III.** Matthey  
Lecture/discussion—3 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. Offered in alternate years.

**\*135. Alternative Logics (4) Matthey**  
Lecture/discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionistic logics, relevance logics, and non-monotonic logics.

**\*137. Philosophy of Language (4) King**  
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy or linguistics. Discussion of philosophical theories of how languages work and philosophical problems arising from thinking about language. Emphasis on modern (1879–present) philosophical views on language.

**\*143. Hellenistic and Neo-Platonic Philosophy (4) I.** Matthey  
Lecture/discussion—4 hours. Prerequisite: course 21. Greek philosophy after Aristotle, including Epicureanism, Stoicism, Skepticism and Neo-Platonism. GE: ArtHum, Wrt.

**\*145. Medieval Philosophy (4) The Staff**  
Lecture/discussion—3 hours; written reports. Prerequisite: course 21. Study of major philosophers in the medieval period. GE credit: ArtHum, Wrt.

**\*151. Philosophy of the Nineteenth Century (4) III.** Matthey  
Lecture/discussion—4 hours. Prerequisite: courses 21, 22, or 23 recommended. Idealism of Hegel, the pessimism of Schopenhauer, Marxism, the irrationalism of Kierkegaard, Nietzsche and Dostoevsky. GE credit: ArtHum, Wrt.

**\*155. American Philosophy (4) The Staff**  
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C.I. Lewis.

**156. Contemporary Analytic Philosophy (4) III.** King  
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.

**\*158. Phenomenology and Existentialism in Germany (4) The Staff**  
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thinkers such as Husserl, Heidegger, Jaspers.

**\*159. Phenomenology and Existentialism in France (4) The Staff**  
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century French thinkers such as Sartre, Marcel, Merleau-Ponty.

**160. Pre-Socratics (4) III.** Wedin  
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the

Pythagoreans, Heraclitus, Parmenides, Empedocles, Anaxagoras, and the atomists.

**\*161. Plato (4) The Staff**  
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. Offered in alternate years.

**162. Aristotle (4) III.** Wedin  
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. Offered in alternate years.

**\*168. Descartes (4) III.** The Staff  
Lecture/discussion—4 hours. Prerequisite: course 22. Descartes' metaphysics, theory of knowledge, and philosophy of science. Readings from *Meditations on First Philosophy* and *Principles of Philosophy*. Offered in alternate years.

**\*169. Spinoza (4) The Staff**  
Lecture/discussion—4 hours. Prerequisite: course 22.

**\*170. Leibniz (4) III.** The Staff  
Lecture/discussion—4 hours. Prerequisite: course 22. Survey of the philosophical writings of G. W. Leibniz. Topics include Leibniz's logic, the existence of God, human freedom, substance, and the relation between science and metaphysics. Offered in alternate years.

**\*172. Locke and Berkeley (4) I.** The Staff  
Lecture—4 hours. Prerequisite: course 23. Examination of Locke's *Essay Concerning Human Understanding* and Berkeley's *Principles of Human Knowledge* and *Three Dialogues*. Topics include abstract ideas, existence of matter, primary and secondary qualities, the existence of God, and the nature of scientific knowledge.

**174. Hume (4) I.** Matthey  
Lecture/discussion—4 hours. Prerequisite: course 23. Examination of David Hume's *Treatise of Human Nature* and related writings. Topics include space and time, necessity, induction, skepticism concerning the external world and concerning personal identity. Offered in alternate years.

**\*175. Kant (4) Matthey**  
Lecture/discussion—4 hours. Prerequisite: course 23. Intensive examination of the *Critique of Pure Reason*. Topics include the extent and limitations of human cognition, space and time, substance and causality, freedom and determinism, and the existence of God. Offered in alternate years.

**\*177. Hegel (4) The Staff**  
Lecture/discussion—4 hours. Prerequisite: courses 23 and 175 recommended.

**190. Special Topics in the History of Philosophy (4) I.** Wedin  
Lecture—3 hours; term paper. Intensive study of special topic, problem, or authors in the history of philosophy. May be repeated for credit.

**193. Research in Philosophy (2) I, II, III.** The Staff (Chairperson in charge)  
Term paper/discussion—2 hours. Prerequisite: consent of instructor. Individual research resulting in a paper on a specific topic in one of various fields of philosophy. May be repeated twice for credit.

**194HA-194HB. Honors Research Project (4-4) I, II, III.** The Staff (Chairperson in charge)  
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) I, II, III.** The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**201. Metaphysics** (4) III. Jubien  
Seminar—3 hours; term paper. Topics vary from quarter to quarter. Sample topics include modality, truth, ontology, events, and causation. May be repeated for credit.

**\*202. Theory of Knowledge** (4) III. The Staff  
Seminar—4 hours.

**\*206. Philosophical Argumentation** (4) The Staff  
Seminar—3 hours; short papers. Prerequisite: graduate standing. Investigation and evaluation of philosophical arguments. Critical discussion of student papers on various aspects of philosophical disputes.

**\*207. Philosophy of Physics** (4) The Staff  
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. An intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of spacetime theories, the interpretation of quantum mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor.

**\*208. Philosophy of Biology** (4) Griesemer  
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive treatment of one or more general topics in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology, and cultural evolution. May be repeated for credit with consent of instructor.

**\*210. Philosophy of Science** (4) II. Teller  
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Treatment of one or more general topics of current interest in the philosophy of science, such as scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. Course may be repeated for credit with consent of instructor.

**\*212. Philosophy of Logic and Mathematics** (4) The Staff  
Seminar—3 hours; term paper. Prerequisite: course 112 or 113, or Mathematics 108 or 125, or the equivalent. Philosophical issues in logic and mathematics. 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.

**214. Ethics** (4) I. The Staff; II. Copp  
Seminar—3 hours; term paper.

**217. Political Philosophy** (4) II. Dworkin  
Seminar—3 hours; term paper. Prerequisite: graduate student standing. Advanced study of issues in political philosophy. May be repeated for credit with consent of instructor.

**237. Philosophy of Language** (4) III. King  
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy 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 with consent of instructor when the content is sufficiently distinct.

**\*261. Plato** (4) The Staff  
Seminar—3 hours.

**262. Aristotle** (4) I. Wedin  
Seminar—3 hours.

**275. Kant** (4) II. Cummins  
Seminar—3 hours.

**\*290. History of Philosophy** (4) I. Matthey  
Seminar—3 hours. Special topics in the history of philosophy.

**\*293. The Emotions** (4) The Staff  
Seminar—3 hours; term paper. Prerequisite: graduate standing; open to undergraduates with consent of instructor. Considers the emotions in their full variety. Relates emotion to desire, to belief, to sensation, to behavior, and to rationality. Cultural interpretations of emotion will be reviewed. Ancient and modern writers will be read. Offered in alternate years.

**298. Group Study** (1-5) III. Copp

**299. Research** (1-12) I, II, III. The Staff  
(Chairperson in charge)  
(S/U grading only.)

**Professional Course**

**396. Teaching Assistant Training Practicum**  
(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Physical Education

See Exercise Science

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## Physical Medicine and Rehabilitation

See Medicine, School of

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## Physics

(College of Letters and Science)  
Barry M. Klein, Ph.D., Chairperson of the Department  
Joseph E. Kiskis, Ph.D., Vice Chairperson of the Department (Graduate Matters)  
Wendell H. Potter, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)  
Department Office, 225 Physics/Geology Building  
(530-752-1500)  
World Wide Web: <http://info-physics.ucdavis.edu>

**Faculty**

Robert H. Becker, Ph.D., Professor  
Franklin P. Brady, Ph.D., Professor  
Steven Carlip, Ph.D., Associate Professor  
Daniel A. Cebra, Ph.D., Assistant Professor  
Ling-Lie Chau, Ph.D., Professor  
Shirley Chiang, Ph.D., Professor  
Lawrence B. Coleman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Linton R. Corruccini, Ph.D., Professor  
Daniel L. Cox, Ph.D., Professor  
Charles S. Fadley, Ph.D., Professor  
Ching-Yao Fong, Ph.D., Professor  
John F. Gunion, Ph.D., Professor  
Joseph E. Kiskis, Ph.D., Professor  
Barry M. Klein, Ph.D., Professor  
Winston T. Ko, Ph.D., Professor  
Richard L. Lander, Ph.D., Professor  
Sudhindra Mani, Ph.D., Associate Professor  
Douglas W. McColm, Ph.D., Senior Lecturer  
David E. Pellett, Ph.D., Professor  
Warren E. Pickett, Ph.D., Professor  
Wendell H. Potter, Ph.D., Senior Lecturer  
Richard T. Scalett, Ph.D., Professor  
Robert N. Shelton, Ph.D., Professor  
Rajiv R.P. Singh, Ph.D., Professor  
David J. Webb, Ph.D., Associate Professor  
Philip M. Yager, Ph.D., Professor  
Xiangdong Zhu, Ph.D., Associate Professor  
Rena J. Zieve, Ph.D., Assistant Professor  
Gergely Zimanyi, Ph.D., Professor

**Emeriti Faculty**

Thomas A. Cahill, Ph.D., Professor Emeritus  
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  
Neal Peek, Ph.D., Senior Lecturer Emeritus  
Roderick V. Reid, Jr., Ph.D., Professor Emeritus  
William W. True, Ph.D., Professor Emeritus

**Affiliated Faculty**

Rodney W. Cole, Ph.D., Lecturer  
Randy R. Harris, Ph.D., Lecturer  
Harry B. Radousky, Ph.D., Associate Adjunct Professor  
Ramona Vogt, Ph.D., Assistant Adjunct Professor  
Craig R. Wuest, Ph.D., Associate 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 tick. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

**The Program.** The Department of Physics offers three degree programs: the Bachelor of Arts in Physics, and the Bachelor of Science in Physics 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     |
| <b>Preparatory Subject Matter</b> .....                                                              | <b>41</b> |
| Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....                                              | 16        |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....                                                       | 22        |
| Engineering 5 (or equivalent programming course) .....                                               | 3         |
| <b>Depth Subject Matter</b> .....                                                                    | <b>39</b> |
| Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112, 115A, 122 .....                              | 28        |
| At least 7 units from Physics 105BL, 105C, 110C, 115B, 127, 129A, 129B, 130A, 130B, 140A, 140B ..... | 7         |
| At least 4 additional upper division units in physics .....                                          | 4         |
| <b>Total Units for the Major</b> .....                                                               | <b>80</b> |

**Recommended**

Chemistry 2A-2B-2C or 2AH-2BH-2CH. See also recommended elective courses following the B.S. program below.



**B.S. Major Requirements:**

|                                                                                                                                                                                        | UNITS      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                | <b>56</b>  |
| Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....                                                                                                                                | 16         |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....                                                                                                                                         | 22         |
| Engineering 5 (or equivalent programming course) .....                                                                                                                                 | 3          |
| Chemistry 2A-2B-2C or 2AH-2BH-2CH .....                                                                                                                                                | 15         |
| <b>Depth Subject Matter</b> .....                                                                                                                                                      | <b>54</b>  |
| Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 110C, 112, 115A, 115B, 122 .....                                                                                                    | 34         |
| At least 10 units from Physics 105BL, 105C, 127, 129A, 129B, 130A, 130B, 140A, 140B .....                                                                                              | 10         |
| At least 10 additional upper division units from physics. (No more than 6 units in courses numbered 194H, 195, 198, and 199 may be applied in satisfaction of this requirement.) ..... | 10         |
| <b>Total Units for the Major</b> .....                                                                                                                                                 | <b>110</b> |

**Applied Physics****B.S. Major Requirements:**

|                                                                                                                                                                                                                                        | UNITS      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                | <b>56</b>  |
| Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....                                                                                                                                                                                | 16         |
| Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....                                                                                                                                                                                         | 22         |
| Engineering 5 (or equivalent programming course) .....                                                                                                                                                                                 | 3          |
| Chemistry 2A-2B-2C or 2AH-2BH-2CH .....                                                                                                                                                                                                | 15         |
| Any recommended courses for a particular concentration.                                                                                                                                                                                |            |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                      | <b>54</b>  |
| Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112, 115A, 116A, 116B, 122 .....                                                                                                                                                    | 36         |
| At least 18 units from approved courses within one of the following concentrations chosen in consultation with a major adviser .....                                                                                                   | 18         |
| Materials science, quantum optics, chemical physics, atmospheric physics, geophysics, physical oceanography. (Lists of approved courses in each concentration with representative programs are available from the Physics Department.) |            |
| <b>Total Units for the Major</b> .....                                                                                                                                                                                                 | <b>110</b> |

**Recommended Electives**

*Astronomy:* Astronomy 2.  
*Computer and numerical analysis:* Mathematics 128A or Applied Science Engineering 115.  
*Statistics:* Statistics 131A.  
*Advanced mathematics:* Mathematics 108, 118A-118B, 119A-119B, 121A-121B, 127A-127B-127C, 185A, 185B.

**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, 231 Physics/Geology Building, for adviser assignment.

**Minor Program Requirements:**

Three distinct minor emphases are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-21C-21D and 22A-22B and Physics 9A-9B-9C-9D. Students considering the possibility of earning a Physics minor should consult with a Physics major adviser before beginning work in one of these minor programs.

|                                                                                                                                                                         | UNITS        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Physics</b> .....                                                                                                                                                    | <b>18-24</b> |
| <b>Classical Physics</b> emphasis .....                                                                                                                                 | <b>23</b>    |
| Physics 104A-104B, 105A, 105AL, 105C, 108, 108L, 110A-110B .....                                                                                                        | 23           |
| (If the fall quarter courses, 104A, 105A, 110A, 112, are taken in different years, 104A and 105A should be taken in the first year; course 105C does not require 105B.) |              |
| <b>Quantum Physics</b> emphasis .....                                                                                                                                   | <b>22</b>    |
| Physics 104A-104B, 105A, 105AL, 105B, 112, 115A-115B .....                                                                                                              | 22           |
| (Physics 104A-104B and 105A-105B must precede 115A-115B. Physics 110A recommended.)                                                                                     |              |
| <b>General Physics</b> emphasis .....                                                                                                                                   | <b>22</b>    |
| Physics 104A-104B, 105A, 105AL, 105B, 110A, 112, 115A .....                                                                                                             | 22           |
| (Physics 104A-104B and 105A-105B must precede 115A.)                                                                                                                    |              |

**Graduate Study.** The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Specialty. 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, University of California, Davis 95616.

**Astronomy.** There is no major program leading to a degree in Astronomy. Introductory courses are offered in general astronomy and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in observational astrophysics.

**Courses in Astronomy (AST)****Lower Division Courses****2. Introduction to Modern Astronomy and Astrophysics (4) I.** The Staff

Lecture—3 hours; laboratory/discussion—2 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. Modern astronomical instrumentation. Gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, galaxies, and the Universe. Not open to students who have received credit for course 10.

**10. General Astronomy (4) III.** The Staff  
 Lecture—3 hours; laboratory/discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-terrestrial communications. Not open to students who have received credit for course 2 or any physics course (except 10, 137, 160). GE credit: SciEng.

**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.

Note: Faculty listed for each course are well acquainted with the course, but may not teach it this year.

**Lower Division Courses****1A. Principles of Physics (3) I.** McColm

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 5A, 7B, or 9A.

**1B. Principles of Physics (3) II.** McColm

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 5B, 5C, 7A, 7B, 7C, 9B, 9C, or 9D.

**7A. General Physics (4) I, II.** Coleman, Potter, Webb

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: Mathematics 16B (may be taken concurrently). 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 9B, 5B, or 1B.

**7B. General Physics (4) II, III.** Coleman, McColm, Potter

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, 5A, or 1A.

**7C. General Physics** (4) III. I. Coleman, Potter  
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.

**9A. Classical Physics** (4) III. The Staff  
Lecture—3 hours; laboratory—2.5 hours; discus-  
sion—1 hour. Prerequisite: Mathematics 21B.  
Mechanics. Introduction to general principles and  
analytical methods used in physics for physical sci-  
ence and engineering majors. Only two units of credit  
allowed for students who have completed course 1A  
or 7B. Not open for credit to students who have com-  
pleted course 9HA.

**9B. Classical Physics** (4) I. The Staff  
Lecture—3 hours; laboratory—2.5 hours; discus-  
sion—1 hour. Prerequisite: course 9A, Mathematics  
21C, Mathematics 21D (may be taken concurrently).  
Continuation of course 9A. Fluid mechanics, thermo-  
dynamics, wave phenomena, optics. Only two units of  
credit allowed for students who have completed  
course 7A. Not open for credit to students who have  
completed course 9HB or 9HC or Engineering 105A.

**9C. Classical Physics** (4) II. The Staff  
Lecture—3 hours; laboratory—2.5 hours; discus-  
sion—1 hour. Prerequisite: course 9B, Mathematics  
21D, Mathematics 22A (may be taken concurrently).  
Continuation of course 9B. Electricity and magnetism  
including circuits and Maxwell's equations. Only two  
units of credit allowed for students who have com-  
pleted course 7C. Not open for credit to students who  
have completed course 9HD.

**9D. Modern Physics** (4) III. The Staff  
Lecture—3 hours; discussion—1.5 hours. Prerequi-  
site: 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.

**9HA. Honors Physics** (4) I. The Staff  
Lecture—3 hours; discussion/laboratory—4 hours.  
Prerequisite: Mathematics 21B (may be taken concur-  
rently) or consent of instructor; high school physics  
highly recommended. Classical mechanics. Same  
material as course 9A in greater depth. For students  
in physical sciences, mathematics and engineering.  
Only two units of credit allowed to students who have  
completed course 7B. Not open for credit to students  
who have completed course 9A.

**9HB. Honors Physics** (4) II. The Staff  
Lecture—3 hours; discussion/laboratory—4 hours.  
Prerequisite: course 9HA or 9A and Mathematics 21C  
(may be taken concurrently). Special relativity, thermal  
physics. Continuation of course 9HA. Only two units  
of credit allowed to students who have completed  
course 7A. Not open for credit to students who have  
completed course 9B or 9D.

**9HC. Honors Physics** (4) III. The Staff  
Lecture—3 hours; discussion/laboratory—4 hours.  
Prerequisite: course 9HB and Mathematics 21D (may  
be taken concurrently). Waves, sound, optics, quan-  
tum physics. Continuation of course 9HB. Only two  
units of credit allowed to students who have com-  
pleted course 7C. Not open for credit to students who  
have completed course 9B or 9D.

**9HD. Honors Physics** (4) I. The Staff  
Lecture—3 hours; discussion/laboratory—4 hours.  
Prerequisite: course 9HC and Mathematics 21D. Elec-  
tricity and magnetism. Continuation of course 9HC.  
Same material as in course 9C but in greater depth.  
Only two units of credit allowed to students who have  
completed course 7C. Not open for credit to students  
who have completed course 9C.

**9HE. Honors Physics** (4) II. The Staff  
Lecture—3 hours; discussion/laboratory—4 hours.  
Prerequisite: course 9HD and Mathematics 22B (may  
be taken concurrently). Applications of quantum  
mechanics. Not open for credit to students who have  
completed course 9D.

**10. Topics in Physics for Nonscientists** (4) I, II.  
The Staff

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 philoso-  
phy; energy and the environment; and natural phe-  
nomena. Check with the department office for the  
current emphasis. No units of credit allowed if taken  
after any other physics course. GE credit: SciEng.

**90X. Lower Division Seminar** (2) I, II, III.

The Staff

Seminar—2 hours. Prerequisite: lower division stand-  
ing and consent of instructor. Examination of a special  
topic in Physics through shared readings, discus-  
sions, written assignments, or special activities such  
as laboratory work. May be repeated for credit. Lim-  
ited enrollment.

**98. Directed Group Study** (1-5) I, II, III. The Staff  
(Chairperson in charge)

Prerequisite: consent of instructor; primarily for lower  
division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II,  
III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**104A-104B. Introduction to Methods of**

**Mathematical Physics** (3-3) I-II. Chau

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D  
and Mathematics 21D, 22A, and 22B passed with  
grade C- or better; or consent of department; course  
104A passed with a grade C- or better or consent of  
department required for 104B. Applications of linear  
equations and matrices, vector spaces (finite and infi-  
nite dimensional), ordinary and partial differential  
equations, infinite series, functions of one complex  
variable, integration methods, integral transforms,  
and variational methods.

**105A-105B. Analytical Mechanics** (3-3) I-II.

Rouse

Lecture—3 hours. 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; introduc-  
tion to Lagrange's and Hamilton's equations.

**105AL. Computational Laboratory in**

**Mechanics** (1) I. Rouse

Laboratory—3 hours. Prerequisite: Engineering 5 or  
the equivalent; course 105A concurrently. Introduction  
to the application of computers to solving physics  
problems. Introduction to numerical and graphical  
methods in mechanics. (P/NP grading only.)

**105BL. Computational Laboratory in**

**Mechanics** (1) II. Rouse

Laboratory—3 hours. Prerequisite: course 105AL;  
course 105B concurrently. Computer application of  
numerical and graphical methods in mechanics.  
(P/NP grading only.)

**105C. Continuum Mechanics** (3) III. Yager

Lecture—3 hours. Prerequisite: courses 104B and  
105A passed with a grade of C- or better, or consent  
of department. The continuum hypothesis and limita-  
tions. Tensor methods develop stress-strain relations  
for linear isotropic solids/fluids and field equations to  
study wave propagation in solids/fluids, heat flow,  
potential flow and ocean waves.

**108. Optics** (3) III. Zhu

Lecture—3 hours. Prerequisite: course 9 or 5 se-  
quence 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 instru-  
mentation. Open to non-majors.

**108L. Optics Laboratory** (1) III. Zhu

Laboratory—3 hours. Prerequisite: course 108 con-  
currently. The laboratory will consist of one major pro-  
ject pursued throughout the quarter, based on  
modern applications of optical techniques.

**110A-110B-110C. Electricity and Magnetism**

(3-3-3) I-II-III. Ko

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D  
and Mathematics 21D, 22A, and 22B passed with  
grade C- or better, or consent of department; prere-  
quisite for 110B is courses 110A and 104A passed with  
a grade of C- or better or consent of department; pre-  
requisite for course 110C is courses 110B and 104B  
passed with a grade of C- or better, or consent of  
department. Theory of electrostatics, electromagnet-  
ism, Maxwell's equations, electromagnetic waves.

**112. Thermodynamics and Statistical**

**Mechanics** (3) I. Webb

Lecture—3 hours. Prerequisite: course 115A or the  
equivalent. Introduction to classical and quantum sta-  
tistical mechanics and their connections with thermo-  
dynamics. 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.

**115A. Foundations of Quantum Mechanics** (3)

III. Fong, Carlip

Lecture—3 hours. Prerequisite: courses 104B and  
105B passed with grade C- or better, or consent of  
department. Failures of classical physics; particle  
wave duality, probability and quantum mechanical  
operators; the uncertainty principle; the Schrödinger  
equation; energy levels; tunneling.

**115B. Applications of Quantum Mechanics** (3)

I. Fong, Carlip

Lecture—3 hours. Prerequisite: course 115A passed  
with a grade of C- or better, or consent of department.  
Angular momentum and spin; hydrogen atom and  
atomic spectra; perturbation theory; scattering theory.

**116A. Electronic Instrumentation** (4) II. Cebra

Lecture—3 hours; laboratory—3 hours. Prerequisite:  
course 9C, Mathematics 22B. An experimental and  
theoretical study of important electronic circuits com-  
monly used in physics.

**116B. Electronic Instrumentation** (4) III. Pellett

Lecture—3 hours; laboratory—3 hours. Prerequisite:  
courses 9D, 116A. Continuation of course 116A. Intro-  
duction to the use of digital electronics and micro-  
computers in experimental physics.

**121. Atomic Physics** (4) II. McCollm

Lecture—3 hours; term paper. Prerequisite: course  
9D. The phenomena of atomic physics including con-  
temporary work: fine- and hyperfine-structure, quan-  
tum electrodynamics, laser spectroscopy, beam foil  
experiments and trapped atoms.

**122. Advanced Physics Laboratory** (3) I.

The Staff

Laboratory—8 hours. Prerequisite: course 9D. Exper-  
imental techniques and measurements in atomic,  
condensed matter, nuclear and particle physics;  
spectroscopy, optical pumping, magnetic resonance,  
superconductivity, semiconductors, ferroelectricity,  
gamma-ray coincidence, Mossbauer Effect, Ruther-  
ford scattering, muon lifetime. The student performs  
three to six experiments depending on difficulty. Indi-  
vidual work is stressed. May be repeated once for  
credit. GE credit: Wrt.

**127. Introduction to Astrophysics** (3) III. Becker

Lecture—3 hours. Prerequisite: course 105A. Celest-  
rial mechanics, radiation, astrophysical measure-  
ments, electromagnetic processes, the sun, binary  
and variable stars, stellar structure and evolution,  
galaxies, cosmology. Offered in alternate years.

**129A. Introduction to Nuclear Physics** (3) II.

Brady

Lecture—3 hours. Prerequisite: course 115A. 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.

**129B. Nuclear Physics, Extensions and**

**Applications** (4) III. Brady

Lecture—3 hours; term paper. Prerequisite: course  
129A. Continuation of course 129A. Nuclear reac-  
tions, neutrons, fission, fusion accelerators, introduc-  
tion to meson and particle physics, nuclear astro-  
physics, and applications of nuclear physics and

techniques to mass spectrometry, nuclear medicine, trace element analysis. Not offered every year.

**130A-130B. Elementary Particle Physics (3-4)** II-III. Lander

Lecture—3 hours; term paper required for 130B. Prerequisite: course 115A. 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.

**137. Science and Technology of Nuclear Arms Effects and Control (3)** II. Cox

Lecture—3 hours. Prerequisite: upper division standing; one course from courses 1B, 5C, 9D, 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (Same course as Applied Science Engineering 137.) GE credit: SciEng or SocSci.

**140A-140B. Introduction to Solid State Physics (3-4)** II-III. Klein

Lecture—3 hours; term paper required for 140B. Prerequisite: course 115A or the equivalent. 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.

**160. Environmental Physics and Society (3)** III. Cox

Lecture—3 hours. Prerequisite: course 9D or 5C; 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.

**190X. Upper Division Seminar (1-2)** I, II, III. The Staff

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 Physics. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollment.

**194HA-194HB. Special Study for Honors Students (4-4)** I, II, III. The Staff (Chairperson in charge)

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)** I, II, III. The Staff (Chairperson in charge)

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.

**197T. Tutoring in Physics and Astronomy (1-5)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**200A. Theory of Mechanics and Electromagnetics (4)** I. Yager

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.

**200B-200C. Theory of Mechanics and Electromagnetics (4-4)** II-III. Reid

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.

**204A-204B. Methods of Mathematical Physics (4-4)** I-II. Singh

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.

**210. Computational Physics (3)** III. Singh

Lecture—3 hours. Prerequisite: knowledge of Fortran or C. Analytic techniques to solve differential equations and eigenvalue problems. Physics content of course will be self-contained, and adjusted according to background of students.

**215A-215B-215C. Quantum Mechanics (4-4-4)** I-II-III. Erickson

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.

**219A-219B. Statistical Mechanics (4-4)** I-II. Scalettar

Lecture—3 hours; independent study—1 hour. Prerequisite: course 215B or the equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with applications to properties of solids, real gases, nuclear matter, etc.; fluctuations about the equilibrium state; and phase transitions and critical phenomena.

**221. Atomic Physics (3)** II. McColm

Lecture—3 hours; seminar—1-2 hours. Prerequisite: course 215A-215B. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions. Not offered every year.

**223A. Group Theoretical Methods of Physics—Condensed Matter (3)** III. Fong

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)** III. Kiskis

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)** II. Cebra

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)** III. Cebra

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)** I. Brady

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)** II. Brady

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)** III. Brady

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)** I. Gunion

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

**230B. Quantum Theory of Fields (3)** II. Gunion

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

**240A-240B. Solid State Physics (3-3)** III-I. Corruccini

Lecture—3 hours. Prerequisite: courses 215A-215B-215C; courses 140A-140B recommended. Introduction to the phenomena and theory of the solid state. Periodic structures, lattice structures, electron states, static properties, electron-electron interaction, electron dynamics, transport properties, optical properties, the Fermi surface, magnetism, superconductivity.

**240C-240D. Solid State Physics (3-3)** II-III. Zimanyi

Lecture—3 hours. Prerequisite: course 240A-240B or the equivalent. General introduction to many-body techniques as applied in solid state physics.

**241. Advanced Topics in Magnetism (3)** II. Singh

Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

**242. Advanced Topics in Superconductivity (3)** II. Scalettar

Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

**243A-243B. Surface Physics of Materials (3-3)** II, III. Fadley, Chiang

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. Not offered every year.

**245A. High-Energy Physics (3)** II. Kiskis

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.

**245B. High-Energy Physics (3)** III. Carlip

Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of SU(2)<sub>c</sub> × U(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.

**245C. High-Energy Physics** (3) III. Han  
Lecture—3 hours. Prerequisite: course 245A. Strong interaction: quantum chromodynamics phenomenology; jets and other experimental tests; quark and gluon distribution functions; quark and gluon scattering; applications of the renormalization group. Not offered every year.

**246. Supersymmetry: Theory and Phenomenology** (3) III. Gunion  
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.

**250. Special Topics in Physics** (3) I, II, III. The Staff  
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies. May be repeated for credit. Not offered every quarter.

**252A. Techniques of Experimental Physics** (3) III. Zhu  
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) III. Mani  
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized. Not offered every year.

**260. Introduction to General Relativity** (3) III. Carlip  
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. Offered in alternate years.

**290. Seminar in Physics** (1) I, II, III. The Staff  
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.)

**291. Seminar in Nuclear Physics** (1) I, II, III. The Staff  
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.)

**292. Seminar in Elementary Particle Physics** (1) I, II, III. The Staff  
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.)

**293. Seminar in Condensed Matter Physics** (1) I, II, III. The Staff  
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.)

**295. Introduction to Departmental Research** (1) III. The Staff (Chairperson in charge)  
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.)

**297. Research on the Teaching and Learning of Physics** (3) III. Potter  
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.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

### Professional Course

**390. Methods of Teaching Physics** (1) I, II, III. The Staff  
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.)

## Physiology

See **Anatomy, Physiology and Behavior; Biological Sciences—Neurobiology, Physiology and Behavior; and Human Physiology (Medicine, School of)**

## Physiology (A Graduate Group)

James H. Jones, Ph.D., Chairperson of the Group  
Group Office, 188 Briggs Hall (530-752-9092)

World Wide Web: <http://www.npb.ucdavis.edu/pgg>

**Faculty.** Consists of more than 70 faculty members drawn from various departments in the College of Agriculture and Environmental Sciences, the College of Letters and Science, the Division of Biological Sciences, the School of Medicine, and the School of Veterinary Medicine.

**Graduate Study.** The Graduate Group in 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 physiology and in-depth specialization in cardiorespiratory, cellular, comparative, endocrine, reproductive, exercise, metabolic, neurophysiology, systemic and domestic animal physiology. For information regarding these programs, address the Program staff person at the group office.

**Graduate Advisers.** D. Gietzen (*Anatomy, Physiology and Cell Biology*), A.M. Oberbauer (*Animal Science*), J. Roser (*Animal Science*), and W.J. Weidner (*Neurobiology, Physiology and Behavior*).

**Graduate Admissions Officer.** P. Berger (*Animal Science*).

### Courses in Physiology (PGG)

#### Graduate Courses

**200L. Animal Cell Culture Laboratory** (4) II. B. Wilson, R. Wu  
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.

**210A-210B-210C. Advanced Physiology** (4-6-6) I-III-III. Jones

Lecture—3 hours (210A) or 5 hours (210B and 210C); discussion—1 hour. Prerequisite: graduate student in the Physiology Graduate Group Ph.D. program, or consent of instructor. Advanced course on general principles of physiology, surveying homeostasis, cellular, neurophysiology, cardiovascular, respiratory, renal, endocrine, gastrointestinal, metabolic, reproductive, exercise, comparative, environmental and integrative physiology.

**\*213. Principles of Electronics for Biologists** (2) III. Horowitz

Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5B, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electronics applied to biological measurements. Focuses on interconnection of laboratory instruments including filters and computers. Topics covered include: RC networks; operational amplifiers; digital gates; computer interfacing; and programming.

**214. Neurophysiology** (4) II. Carstens  
Lecture—4 hours. Prerequisite: Neurobiology, Physiology and Behavior 111B, 112; consent of instructor. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity.

**\*215. Neurophysiology Laboratory** (3) III. Horowitz, Scobey

Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate in depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

**216. Neurophysiology Literature** (3) I. Pappone  
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.

**\*217. The Vertebrate Eye** (2) II. Sillman  
Seminar—1 hour; lecture/discussion—1 hour. Prerequisite: graduate standing and a background in biology; Neurobiology, Physiology and Behavior 120F strongly recommended. Physiology, biochemistry, and biology of the vertebrate eye with emphasis on the retina, particularly photoreceptors. A comparative approach will be taken with adaptations in ocular function related to behavior and environment. May be repeated for credit with consent of instructor. Offered in alternate years.

**\*218. Topics in Circulatory Pathophysiology** (3) II. Weidner

Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Selected topic in circulatory or cardiopulmonary physiology will be addressed each offering. Topics will include pathophysiology. Lecture and discussion based on current research literature in the field. May be repeated with consent of instructor. Offered in alternate years.

**219. Muscle Growth and Development** (3) II. R. Carlsen (Human Physiology)

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.

**220. General and Comparative Physiology of Reproduction** (3) I. Anderson (Animal Science), Lasley (Reproduction)

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 vari-

ety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

**\*222. Mammalian Gametogenesis and Fertilization** (3) II. Berger

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.

**\*230. Advanced Endocrinology** (2) II. Moberg  
Lecture—2 hours. Prerequisite: Neurobiology, Physiology and Behavior 130 or the equivalent, and graduate standing. Focus on timely topic of endocrine 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) II. Woolley  
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) I. Woolley

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.)

**242. Biological Rhythms** (3) I. Fuller

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.

**275. Neurohumoral Regulatory Mechanisms of Thermogenesis** (3) II. Horwitz, Horowitz

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) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

**290C. Research Conference in Physiology** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**291A. Selected Topics in Visual Science** (2) III. Chalupa (Psychology), Johnson (Ophthalmology), Sillman (Neurobiology, Physiology and Behavior)  
Seminar—2 hours. Prerequisite: graduate student standing and consent of instructor; course 217 recommended. Vision from the standpoint of physiology, biochemistry, morphology and psychophysics. Consideration of all levels of the visual system from periphery to highest brain centers. Emphasis on recent research. Topics vary each year. May be repeated for credit. (S/U grading only.)

**291B. Seminar in Cellular Mechanisms of**

**Adaptation** (1) I, II, III. Horwitz

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) I. The Staff (Chairperson in charge)

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.)

**293. Current Progress in Physiology** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**297T. Tutoring in Physiology** (3) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour; tutorial—2 hours. Prerequisite: completion of course to be tutored (with a grade of A) and consent of instructor. Advanced study of systemic physiology through leading small discussion groups in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutoring in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**Professional Courses**

**300A-300B. Pedagogical Aspects of Physiology in Higher Education** (3-3) I, II, III. The Staff (Chairperson in charge)

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.)

**390. The Teaching of Physiology** (1) I, II, III. The Staff (Chairperson in charge)

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.)

## Plant Biology

See **Agricultural Systems and Environment; Agronomy; Biological Sciences—Plant Biology; Crop Science and Management; Environmental Horticulture; Plant Biology (A Graduate Group); Plant Pathology; Plant Protection and Pest Management; Pomology; Vegetable Crops; and Viticulture and Enology**

## Plant Biology

Deborah P. Delmer, Ph.D., Chairperson of the Section

Section Office, 1002 Life Sciences Addition  
(530-752-0617)

World Wide Web: <http://www-plb.ucdavis.edu>

**Committee in Charge of the Major**

Deborah Canington, Ph.D. (*Plant Biology*)  
Judy Jernstedt, Ph.D. (*Agronomy and Range Science*), Chairperson  
John Labavitch, Ph.D. (*Pomology*)  
Alan Stemler, Ph.D. (*Plant Biology*)  
Thea Wilkins, Ph.D. (*Agronomy and Range Science*)  
Terence Murphy, Ph.D. (*Plant Biology*)

**Faculty**

Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Sections of the Division of Biological Sciences.

**Primary Section Members**

John L. Bowman, Ph.D., Assistant Professor  
Anne Britt, Ph.D., Assistant Professor  
Deborah P. Delmer, Ph.D., Professor  
Richard H. Falk, Ph.D., Professor  
John J. Harada, Ph.D., Professor  
William J. Lucas, Ph.D., Professor  
Terence M. Murphy, Ph.D., Professor  
Sharman O'Neill, Ph.D., Associate Professor  
Thomas L. Rost, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
Neelima Sinha, Ph.D., Assistant Professor  
Alan J. Stemler, Ph.D., Professor  
Steven M. Theg, Ph.D., Professor  
Robert M. Thornton, Ph.D., Senior Lecturer, *Academic Senate Distinguished Teaching Award*  
Larry N. Vanderhoeft, Ph.D., Professor

**Secondary Section Members**

Judy Callis, Ph.D., Associate Professor  
Richard S. Criddle, Ph.D., Professor  
James A. Doyle, Ph.D., Professor (*Geology*)  
Marilynn E. Etzler, Ph.D., Professor  
Charles S. Gasser, Ph.D., Professor  
R. Marc Learned, Ph.D., Assistant Professor  
Marcel Rejmanek, Ph.D., Associate Professor  
Raymond L. Rodriguez, Ph.D., Professor  
Irwin H. Segel, Ph.D., Professor  
Maureen L. Stanton, Ph.D., Professor  
Donald R. Strong, Ph.D., Professor

**Emeriti Faculty**

Fredrick T. Addicott, Ph.D., Professor Emeritus  
Floyd M. Ashton, Ph.D., Professor Emeritus  
Bruce A. Bonner, Ph.D., Professor Emeritus  
Herbert B. Currier, Ph.D., Professor Emeritus  
Emanuel Epstein, Ph.D., Professor Emeritus  
Ernest M. Gifford, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
Hendrick J. Ketellapper, Ph.D., Professor Emeritus  
Donald W. Kyhos, Ph.D., Professor Emeritus  
Norma J. Lang, Ph.D., Professor Emerita  
C. Ralph Stocking, Ph.D., Professor Emeritus  
John M. Tucker, Ph.D., Professor Emeritus  
Grady Webster, Ph.D., Professor Emeritus  
Kenneth Wells, Ph.D., Professor Emeritus

**Affiliated Faculty**

Deborah Canington, Ph.D., Academic Coordinator/Lecturer  
Ellen Dean, Ph.D., Academic Coordinator/Lecturer

## The Major Program

Plant biology is the study of plants as organisms. It includes the 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 Program.** The Plant Biology major consists of core courses in applied plant biology, plant anatomy, plant physiology, and plant ecology, as well as biochemistry, cell biology, and genetics. In addition, students complete a set of courses in one of the following areas: (1) general botany; (2) applied plant biology; (3) plant evolution and ecology; (4) plant genetics and breeding; and (5) plant physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization. Independent research opportunities in plant biology are available. Consult with an adviser.

**Career Alternatives.** A Plant Biology degree is an excellent credential for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. Plant biologists can work in the field, in the forest, in the laboratory, in botanical gardens or nurseries, in food or seed companies, or in pharmaceutical, energy or chemical industries, and pursue rewarding careers in the areas of biotechnology, environmental protection, or agribusiness. The program is also an excellent background for students wishing to enter graduate or other professional schools, including medicine, law or journalism.

## A.B. Major Requirements:

|                                                                                           | UNITS        |
|-------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                   | <b>35</b>    |
| Biological Sciences 1A-1B-1C .....                                                        | 15           |
| Chemistry 2A-2B, 8A-8B .....                                                              | 16           |
| Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102 .....             | 4            |
| <b>Depth Subject Matter</b> .....                                                         | <b>41-42</b> |
| Biological Sciences 101 .....                                                             | 4            |
| Plant Biology 102 or 108 .....                                                            | 5            |
| Evolution and Ecology 140 or Plant Biology 116 .....                                      | 4            |
| Plant Biology 105, 111, 112, 117 .....                                                    | 15           |
| Additional upper division units in Plant Biology or related natural science courses ..... | 13-14        |
| <b>Total Units for the Major</b> .....                                                    | <b>76-77</b> |
| <b>Recommended</b>                                                                        |              |
| Chemistry 2C; Evolution and Ecology 100; Plant Biology 118, 119.                          |              |

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 sections or departments, may be allowed on *prior* consultation with a Plant Biology major adviser.

## B.S. Major Requirements:

|                                                                                                                                                                                   | UNITS        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                           | <b>60-61</b> |
| Biological Sciences 1A-1B-1C .....                                                                                                                                                | 15           |
| Chemistry 2A-2B-2C .....                                                                                                                                                          | 15           |
| Chemistry 8A-8B .....                                                                                                                                                             | 6            |
| Mathematics 16A-16B-16C .....                                                                                                                                                     | 9            |
| Physics 7A-7B-7C .....                                                                                                                                                            | 12           |
| Agricultural Systems and Environment 120 or Statistics 13, 32, 100, or 102 .....                                                                                                  | 3-4          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                 | <b>45</b>    |
| Biological Sciences 101 or Plant Biology 152 (Students completing the Applied Plant Biology option or the Plant Genetics and Breeding option should take Plant Biology 152) ..... | 4            |
| Biological Sciences 102, 103, 104 .....                                                                                                                                           | 9            |
| Plant Biology 105, 111 .....                                                                                                                                                      | 8            |
| Completion of one Option listed below .....                                                                                                                                       | 24           |
| Research experience through internships or special studies is recommended.                                                                                                        |              |
| <b>General Plant Biology</b> option                                                                                                                                               |              |
| Evolution and Ecology 100, Plant Biology 112 .....                                                                                                                                | 7            |
| Plant Biology 117 or 142 .....                                                                                                                                                    | 4            |
| One course from the Applied Plant Biology course list (Plant Biology 175 recommended) .....                                                                                       | 3-5          |

One course from the Evolution and Diversity course list.....3-5  
 Additional upper division course work from any of the four course lists, chosen in consultation with an adviser, to achieve a total of 24 or more units. At least one course chosen from the option course lists must include a formal laboratory or fieldwork section.....3-7

### Applied Plant Biology option

Plant Biology 112 .....
 3 || Plant Biology 142 or 143 ..... | 3-4 |
| Plant Biology 160, 175 ..... | 8 |
| Molecular and Cellular Biology 120L; Plant Biology 111L, 153, 158, 172L, 189, or Plant Pathology 120 ..... | 3-6 |
| Additional upper division course work from the Applied Plant Biology course list to achieve a total of 24 or more units..... | 3-7 |

### Plant Evolution and Ecology option

Evolution and Ecology 100.....4  
 Plant Biology 117 or 142 .....
 4 || One course from the Applied Plant Biology course list (Plant Biology 175 recommended) ..... | 3-5 |
| Additional upper division course work from the Ecology and/or Evolution and Diversity course list to achieve a total of 24 or more units. At least one course chosen must include a formal laboratory or fieldwork section ..... | 11-13 |

### Plant Genetics and Breeding option

Plant Biology 108 or 143 .....
 3-5 || Plant Biology 154 ..... | 4 |
| Plant Biology 112 or 113 or 160 ..... | 3 |
| Plant Biology 161A or 161B ..... | 4 |
| Addition course work from the Plant Genetics and Breeding course list to achieve a total of 24 or more units ..... | 8-10 |

### Plant Physiology, Development and Molecular Biology option

Plant Biology 112 .....
 3 || Molecular and Cellular Biology 120L, 170L; Plant Biology 111L or 153 ..... | 3-6 |
| One course from the Applied Plant Biology course list (Plant Biology 175 recommended) ..... | 3-5 |
| One course from the Ecology course list (Plant Biology 117 recommended)..... | 3-4 |
| One course from the Evolution and Diversity course list..... | 3-5 |
| Additional upper division course work from the Plant Physiology, Development, and Molecular Biology course list to achieve a total of 24 or more units ..... | 1-9 |
| **Total Units for the Major** ..... | **105-106** |

## Course Lists

### Applied Plant Biology

Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150, 170A, 170B, 195; Atmospheric Science 133; Entomology 100, 100L, 110, 119, 119L, 135; Environmental Horticulture 102, 105, 107, 120, 125, 130, 133; Environmental Toxicology 101; Hydrologic Science 124; International Agricultural Development 101; Nematology 100, 110; Plant Biology 121, 142, 143, 146, 151, 152, 153, 154, 157, 158, 160, 171, 172, 172L, 173, 174, 175, 176, 177, 178, 188, 196; Plant Pathology 120, 125, Pomology 103; Range Science 100, 105, 133, 134; Soil Science 100, 105, 109, 111; Viticulture and Enology 101A, 101B, 101C, 110, 115, 116, 118.

### Ecology

Agricultural Systems and Environment 112; Environmental Science and Policy 121, 123, 124, 128, 128L, 150C, 151, 151L, 155, 155L; Evolution and Ecology 121, 138; Hydrologic Science 122, 122L, 124; Plant Biology 117, 121, 142, 146; Range Science 133, 134.

### Evolution and Diversity

Evolution and Ecology 100, 102, 140, 144, 149; Plant Biology 102, 108, 116, 118, 143, 148.

## Plant Genetics and Breeding

Agricultural Systems and Environment 118, 150; Entomology 110; Evolution and Ecology 100, 144; Molecular and Cellular Biology 161, 164; Plant Biology 116, 117, 142, 151, 153, 157, 175; Plant Pathology 120, 125.

## Plant Physiology, Development, and Molecular Biology

Molecular and Cellular Biology 126; Plant Biology 113, 125, 153, 157, 158, 160; Plant Pathology 130.

**Master Adviser.** A. Stemler, Plant Biology Section Office, 2220 Life Sciences Addition.

## Minor Program Requirements:

|                                                                                                  | UNITS     |
|--------------------------------------------------------------------------------------------------|-----------|
| <b>Plant Biology</b> .....                                                                       | <b>23</b> |
| Biological Sciences 1C (or equivalent introductory plant biology course) .....                   | 5         |
| Upper division units, including at least one course from each of the following four groups ..... | 18        |
| (a) <i>Anatomy and morphology:</i><br>Evolution and Ecology 140, Plant Biology 105, 116, 118.    |           |
| (b) <i>Physiology and development:</i><br>Plant Biology 111, 112, 125, Plant Pathology 130.      |           |
| (c) <i>Evolution and ecology:</i><br>Evolution and Ecology 100, Plant Biology 102, 117, 143.     |           |
| (d) <i>Applied plant biology:</i><br>Agronomy 100, Plant Biology 154, 160, 171, 172, 175.        |           |

**Minor Adviser.** Same as for major above.

**Honors and Honors Programs.** Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

**Teaching Credential Subject Representative.** R.M. Thornton (*Section of Plant Biology*), 278 Robbins Hall. See also the Teacher Education Program.

**Graduate Study.** Consult the Plant Biology Graduate Group listing.

## Courses in Plant Biology (PLB)

### Lower Division Courses

#### 1. Plants for Garden, Orchard and Landscape

(2) I, III. Marrush (Vegetable Crops)  
 Lecture—1 hour; laboratory—3 hours. For non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagating trees and vines, 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 Agricultural Systems and Environment 2 or Plant Science 1. (Former course Plant Science 1.) (P/NP grading.)

#### 11. Plants and the Biosphere (3) I. Falk

Lecture—3 hours; one weekend field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in examining our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Intended primarily for non-science majors. GE credit: SciEng, Wrt.

#### 12. Plants and People (3) I. Bradford; II. Bennett, Michelmore; III. Nevins (Vegetable Crops)

Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. Not open for credit to students who have completed Plant Science 10. (Former course Plant Science 10.) GE credit: SciEng, Div, Wrt.



**90X. Plant Science Seminar** (1-4) I, II, III.

The Staff

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 Science 90X. (Former course Plant Science 90X.)

**92. Internship** (1-12) I, II, III. The Staff

(Chairperson in charge)

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) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.

The Staff (Chairperson in charge.)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

*For questions about courses numbered 102 through 125, see the Plant Biology Section Office, 1002 Life Sciences Addition. For questions concerning courses numbered 142 through 188, see the Plant Science Advising Center, 152 Hunt Hall.*

**102. California Floristics** (5) III. Dean

Lecture—2 hours; lecture/discussion—1 hour; laboratory—6 hours (includes three one-day, weekend field trips). Prerequisite: Biological Sciences 1A, 1B, 1C or the equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vascular plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora.

**105. Developmental Plant Anatomy** (5) I. Rost

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.

**108. Systematics and Evolution of Angiosperms** (5) III. Doyle

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B and 1C. 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.

**111. Plant Physiology** (3) I. Stemler

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently); Physics 7A, 7B, 7C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration.

**111D. Problems in Plant Physiology** (1) I.

Stemler

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.)

**111L. Introductory Plant Physiology Laboratory** (5) III. Murphy

Lecture/discussion—1 hour; laboratory—9 hours; extensive writing. Prerequisite: course 111 (may be taken concurrently) or 112 or consent of instructor (both recommended). Introduction to basic experimental techniques and instruments used in the investigation of plant physiological processes, such as photosynthesis, water and solute transport, tissue cultures, and detection of hormones.

**112. Plant Growth and Development** (3) II.

Thornton

Lecture—3 hours. Prerequisite: Biological Sciences 1C, 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.

**112D. Problems in Plant Growth and Development** (1) II. Thornton

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.)

**113. Molecular and Cellular Biology of Plants** (3) III. Harada

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Biological Sciences 102 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.

**113D. Problems in Molecular and Cellular Biology of Plants** (1) III. Harada

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.)

**116. Plant Morphology and Evolution** (5) II.

Jernstedt

Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 1C); plant anatomy recommended (e.g., course 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.

**117. Plant Ecology** (4) I. Pearcy

Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; course 112; course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for Evolution and Ecology 121. (Same course as Evolution and Ecology 117.)

**118. Introductory Phycology and Bryology** (4)

II. Canington

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1C. Comparative morphology, physiology, development and reproduction of cyanobacteria, the major algal groups, and the bryophytes. Focus on structure-function and evolutionary relationships. Ecological factors and commercial uses considered. Laboratory includes study of living organisms and identification exercises.

**121. Biology of Weeds** (3) III. Rejmanek

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures.

**\*123. Plant-Virus-Vector Interaction** (3) I. Lucas,

Gilbertson, Ullman

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.)

**\*125. Molecular Biology of Plant Development**

(3) III. The Staff

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biological Sciences 103; Molecular and Cellular Biology 161 or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues.

**126. Plant Biochemistry** (3) III. Callis, Abel

Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent, and Biological Sciences 103. 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.)

**141. Principles and Methods of Ethnobotany**

(4) II. Potter (Pomology)

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalent; course 108 recommended. Examination of concepts, questions, and methods in ethnobotany, the study of human-plant interactions. Specific topics include traditional and scientific classification systems, uses of specific plants, plant evolution under domestication, and ethical issues related to ethnobotany. GE credit: SciEng or SocSci, Wrt.

**142. Ecology of Crop Systems** (4) II. Denison

(Agronomy and Range Science)

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C; 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. GE credit: SciEng.

**143. Evolution of Crop Plants** (3) III. Gepts

(Agronomy and Range Science)

Lecture—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Origins of crops and agriculture, including methodological approaches, center of origin and diversity, crop dissemination pathways, and differences between wild and cultivated plants. Group studies of individual crops are published on the Internet. Not open for credit to students who have completed Plant Science 103 (Former course Plant Science 103.) GE credit: SciEng, Wrt.

**144. Trees and Forests** (3) I. Barbour, Berry

(Environmental Horticulture), Bledsoe (Land, Air

and Water Resources), DeJong (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1C and upper division standing. 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. (Same course as Environmental and Resource Sciences 144/Environmental Horticulture 144.) Not open for credit to students who have completed Plant Science 106. (Former course Plant Science 106.)

**146. Rhizosphere Ecology** (3) III. Phillips

(Agronomy and Range Science)

Lecture—2 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Effects of plant-microbe interactions on plant growth, soil formation, and agricultural sustainability. Physical, chemical and biological processes that occur at the surface of plant roots. Evolution and modification of the biochemical and genetic bases of rhizosphere ecology.

**148. Introductory Mycology** (5) I. MacDonald,

Rizzo (Plant Pathology)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. Not open for credit to students who have completed former course 119, Botany/Plant Pathology 119. (For-

mer course 119, Botany/Plant Pathology 119.) (Same course as Plant Pathology 148.)

**\*151. Plant Genetic Resources for Global Crop Production** (3) I. Potter (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1B or 10. Biological and social factors that influence availability of plant genetic resources for discovery of useful new substances and improvement of cultivated plants. Effects of ethical issues, property rights and biological systems on conservation strategies in local and global contexts. GE credit: SciEng, Wrt.

**152. Plant Genetics** (4) I. Wilkins (Agronomy and Range Science)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A 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 for credit to students who have completed Plant Science 105. (Former course Plant Science 105.)

**\*153. Plant, Cell, Tissue and Organ Culture** (4) II. Sutter (Pomology)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years. Not open for credit to students who have completed Plant Science 107. (Former course Plant Science 107.)

**154. Introduction to Plant Breeding** (4) II. St. Clair (Vegetable Crops)

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. (Former course Plant Science 113.)

**157. Physiology of Environmental Stresses in Plants** (3) II. Richards, Läuchli, Silk (Land, Air and Water Resources)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses. Not open for credit to students who have completed Plant Science 126. (Former course Plant Science 126.)

**158. Mineral Nutrition of Plants** (4) III. Richards (Land, Air, and Water Resources), Brown (Pomology)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Plant Biology/Plant Science 135. (Former course Plant Biology/Plant Science 135.)

**160. Principles of Plant Biotechnology** (3) II. Dandekar (Pomology)

Lecture—3 hours. Prerequisite: Biological Sciences 1A and 101. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement. Not open for credit to students who have completed Plant Science 140. (Former course Plant Science 140.)

**161A. Plant Genetics and Biotechnology Laboratory** (4) I. Dandekar (Pomology),

Dubcovsky (Agronomy and Range Science) Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. Techniques of genetic analysis at the molecular and organismal levels, including segregation and linkage analysis, cytogenetics and

recombinant DNA. Not open for credit to students who have completed Plant Science 141A. (Former course Plant Science 141A.)

**161B. Plant Genetics and Biotechnology Laboratory** (4) II. Harada (Plant Biology), Wilkins, (Agronomy and Range Science)

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 152 and/or 160. 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 completed Plant Science 141B. (Former course Plant Science 141B.)

**171. Plant Propagation** (4) III. Sutter (Pomology) Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Science 109. (Former course Plant Science 109.)

**172. Postharvest Physiology and Handling of Horticultural Commodities** (3) I. Kader (Pomology), Reid (Environmental Horticulture), Saltveit (Vegetable Crops)

Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., Agricultural Systems and Environment 2, course 12 or Food Science and Technology 2); concurrent enrollment in course 172L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres. Not open for credit to students who have completed Plant Science 112. (Former course Plant Science 112.)

**172L. Postharvest Physiology and Handling Laboratory** (2) I. Kader (Pomology), Saltveit (Vegetable Crops)

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 172 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 172. Not open for credit to students who have completed Plant Science 112L. (Former course Plant Science 112L.)

**173. Biological Applications in Fruit Tree Management** (2) II. DeJong (Pomology)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2 or the equivalents. Physiology, growth, development and environmental requirements of fruit trees and 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 who have completed Plant Science 115. (Former course Plant Science 115.)

**174. Biological Applications in Fruit Production** (2) III. De Young, Polito (Pomology)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Agricultural Systems and Environment 2; course 173 recommended. Reproductive biology of tree-crop species. Biological principles of fruit production, tree nutrition and orchard management. Laboratories emphasize hands-on work with orchard tree systems.

**175. Applied Plant Biology** (4) II. Brown, Labavitch (Pomology)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111, and Biological Sciences 101 or course 152. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and environmental enhancement. Current research, applications, and issues in crop improvement, production and biotechnology will be presented and discussed. Not open for credit to students who have completed Plant Science 145. (Former course Plant Science 145.)

**176. Introduction to Weed Science** (3) II. Bayer Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B. Principles of weed science including mechanical, biological, and chemical control methods. Weed control

in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Slight identification of common weeds and demonstrations to illustrate the principles. Not open for credit to students who have completed former course 120. (Former course 120.)

**177. Action of Herbicides** (3) III. Bayer/Falk

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 176; Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed former course 122. (Former course 122.)

**\*178. Biology and Management of Freshwater Macrophytes** (3) I. Anderson (Weed Science)

Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 8B; course 111 or Hydrologic Science 122 recommended. Brief survey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in alternate years. Not open for credit to students who have completed former course 150. (Former course 150.)

**188. Undergraduate Research: Proposal** (3) III. Bloom, Yoder (Vegetable Crops)

Lecture/discussion—3 hours. Prerequisite: upper division standing and consent of instructor. Through lectures, class discussion and individual mentoring, students will define a problem, identify objectives, conduct a literature survey, generate testable hypotheses, design experiments, plan data analysis, prepare an outline, and write a scientific proposal. (Same course as Agricultural Systems and Environment 188.) Not open for credit to students who have completed Plant Science 191, Vegetable Crops 191. (Former course Plant Science 191.)

**189. Experiments in Plant Biology: Design and Execution** (3) I, II, III. The Staff.

Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C 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.)

**190C. Research Conference in Botany** (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: upper division standing in botany or related discipline; consent of instructor. Introduction to research methods in botany. 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.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Section faculty. (P/NP grading only.)

**194H. Special Study for Honors Students** (1-5) I, II, III. The Staff (Chairperson in charge)

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.)

**196. Postharvest Technology of Horticultural Crops** (3) III. Kader (Pomology) in charge

Lecture/discussion/demonstration—5 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for pre-enrollment. Not open for credit to students who have com-

pleted Plant Science 196. (Former course Plant Science 196.) (P/NP grading only.)

**197T. Tutoring in Botany** (1-5) I, II, III. The Staff Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory or discussion sections. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge.) Prerequisite: consent of instructor. (P/NP grading only.)

## Plant Biology (A Graduate Group)

John Labavitch, Ph.D., Chairperson of the Group  
Group Office, 1012 Life Sciences Addition  
(530-752-7094; Fax: 530-752-5410)

World Wide Web: <http://www-plb.ucdavis.edu/pbagg>

**Faculty.** Includes 100 faculty members from 15 departments in the field of plant biology.

**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 research 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 molecular biology; ecology, systematics, and evolution; integrative plant and crop physiology; and plant development and structure. 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, paleobotany, 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 prerequisite 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

**\*201. Plant Senescence: Cellular and Molecular Aspects** (4) II. Labavitch (Pomology), Bennett (Vegetable Crops) 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.

**\*202. Advanced Physiology of Cultivated Plants** (2) I. Matthews (Viticulture), DeJong (Pomology) 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 round-table discussion led by students on focused sub-topics in the source-sink area. Offered in alternate years. (S/U grading only.)

**\*205B. Advanced Plant Physiology** (3) II. Stemler Lecture/discussion—3 hours. Prerequisite: Plant Biology 111, 112, and Biological Sciences 103. Photosynthesis, photophosphorylation, chloroplast metabolism and biology. Offered in alternate years.

**205C. Advanced Plant Physiology/Biochemistry** (3) III. Delmer 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.

**\*206B. Advanced Plant Physiology Laboratory** (3) Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently); Molecular and Cellular Biology 120L. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

**\*206C. Advanced Plant Physiology Laboratory** (3) I. The Staff Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

**208. Plant Hormones and Regulators** (4) II. Labavitch (Pomology) 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.

**210. Plant Ecophysiology** (3) II. Pearcy 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.

**\*211. Ecophysiological Methods** (3) III. Pearcy 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.

**\*212. Physiology of Herbicidal Action** (3) III. Bayer 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.

**214. Higher Plant Cell Walls** (3) I. Labavitch (Pomology), Nevins (Vegetable Crops), Delmer 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.

**\*215. Light and Plant Growth** (3) II. Bonner Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 5B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Course offered in alternate years.

**216. Advanced Topics in Mineral Nutrition** (4) III. Lauchli (Land, Air and Water Resources) Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 135 or consent of instructor. Cellular

compartmentation of mineral elements, new methods and results; selected topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. Offered in alternate years.

**\*217. Membrane Biology of Plants** (3) III. Bennett, Lucas 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.

**\*218A. Advanced Concepts in Plant Cell Biology: Cell Biogenesis** (3) III. Bennett, Theg 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.

**218B. Advanced Concepts in Plant Cell Biology: Signal Transduction and Intercellular Communication** (3) III. Lucas 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.

**\*219. Reproductive Biology of Flowering Plants** (3) I. Wu (Environmental Horticulture), Polito 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 Science 270.)

**220. Plant Developmental Biology** (4) III. Bowman, O'Neill, Liu 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.

**\*221. Special Topics in Plant Physiology** (2) III. The Staff Discussion—1 hour; seminar—1 hour; term paper. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. May be repeated for credit. (S/U grading only.)

**\*222. Special Topics in Plant Morphology, Systematics, and Ecology** (2) II. The Staff Seminar—2 hours; term paper. Analysis of recent advances in plant structure and evolution. Lectures and discussions by research specialists. May be repeated once for credit. Offered in alternate years. (S/U grading only.)

**223. Special Topics in Scientific Method** (2) I. Bradford 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.)

**224. Water in Physiology and Ecology of Plants** (4) III. Hsiao (Land, Air and Water Resources) Lecture—3 hours; discussion—1 hour. Prerequisite: Hydrologic Science 124, or Plant Biology 111 and 117, or consent of instructor. Evapotranspiration and energy balance; water and component potentials; water transport to, within, and from plants; dynamics and regulation of water status; drought resistance; responses to water deficits and salinity; water use effi-



ciency; adaptation to aridity; productivity in relation to water. Offered every fourth quarter. (Former course Plant Science 224.)

**\*225. Methods and Instrumentation for Crop and Soil Science** (3) III. Denison, Brown, Hartz, Hsiao

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.

**227. Plant Molecular Biology** (4) II. Bowman, Sinha, Britt

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.

**\*228. Plant Molecular Biology Laboratory** (5) II. Harada

Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structures, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Vegetable Crops 228.)

**\*229. Molecular Biology of Plant Reproduction** (3) II. O'Neill

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.

**\*231. Biological Electron Microscopy** (1) I. Falk

Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

**\*231L. Biological Electron Microscopy Laboratory** (3) I. Falk

Laboratory—9 hours. Prerequisite: consent of instructor; course 231 (may be taken concurrently). Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

**\*255. Principles of Plant Taxonomy** (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 108; Evolution and Ecology 100 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—atomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories.

**\*256A. Experimental Plant Taxonomy** (2) II. Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Biology 108; Plant Biology 117 and Evolution and Ecology 100 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in alternate years.

**\*256B. Experimental Plant Taxonomy** (2) III. Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Continuation of course 256A. Study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Offered in alternate years.

**290A. Faculty Seminar** (1) I. The Staff

Seminar—1 hour. Seminars presented by members of Plant Biology faculty describing their areas of

research. Required of all beginning students in the Plant Biology Graduate Group. (S/U grading only.)

**290B. Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.)

**290C. Research Conference in Botany** (1) I, II, III. The Staff

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.)

**291. Graduate Student Seminar in Plant Biology** (1) II, III. The Staff

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.)

**292. Seminars in Plant Biology** (1) II. The Staff  
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.)

**293. Seminar in Postharvest Biology** (1) I, II, III. The Staff

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.)

**297T. Tutoring in Plant Biology** (1–5) I, II, III. The Staff

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) I, II, III. The Staff  
Prerequisite: graduate standing.

**299. Research** (1–12) I, II, III. The Staff  
Prerequisite: graduate standing. (S/U grading only.)

**Professional Course**

**390. The Teaching of Plant Biology** (2) I, II, III. The Staff

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.)

## Plant Pathology

(College of Agricultural and Environmental Sciences)

James D. MacDonald, Ph.D., Chairperson of the Department

Department Office, 354 Hutchison Hall  
(530-752-0300)

World Wide Web: <http://www.plpnem.ucdavis.edu/PLP/courses/courses.htm>

**Faculty**

Richard M. Bostock, Ph.D., Professor  
George Bruening, Ph.D., Professor  
John M. Duniway, Ph.D., Professor  
Lynn Epstein, Ph.D., Associate Professor  
Bryce W. Falk, Ph.D., Professor  
Robert L. Gilbertson, Ph.D., Associate Professor  
David G. Gilchrist, Ph.D., Professor  
Thomas R. Gordon, Ph.D., Associate Professor  
Clarence I. Kado, Ph.D., Professor  
Bruce Kirkpatrick, Ph.D., Associate Professor

James D. MacDonald, Ph.D., Professor (*Plant Pathology, Environmental Horticulture*)

David Rizzo, Ph.D., Assistant Professor

Pamela C. Ronald, Ph.D., Associate Professor

Brett M. Tyler, Ph.D., Professor

Ariena H.C. van Bruggen, Ph.D., Professor

Robert K. Webster, Ph.D., Professor

**Emeriti Faculty**

Edward E. Butler, Ph.D., Professor Emeritus

Robert N. Campbell, Ph.D., Professor Emeritus

James E. DeVay, Ph.D., Professor Emeritus

W. Harley English, Ph.D., Professor Emeritus

Raymond G. Grogan, Ph.D., Professor Emeritus

William B. Hewitt, Ph.D., Professor Emeritus

Bert Lear, Ph.D., Professor Emeritus

Srecko John M. Mircetich, Ph.D., Lecturer Emeritus

George Nyland, Ph.D., Professor Emeritus

**Affiliated Faculty**

Greg Browne, Ph.D., Research Plant Pathologist

E. Civerolo, Ph.D., Lecturer

R. Michael Davis, Ph.D., Lecturer

Deborah A. Golino, Ph.D., Lecturer

W. Douglas Gubler, Ph.D., Lecturer

Jerry K. Uyemoto, Ph.D., Lecturer

**Related Major Program.** See the major in Plant Biology.

**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 section in this catalog.

**Graduate Advisers.** R. Gilbertson, B. Kirkpatrick, B.M. Tyler, A.H.C. van Bruggen.

## Courses in Plant Pathology (PLP)

**Lower Division Course**

**40. Edible Mushroom Cultivation** (2) II. Davis

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.

**Upper Division Courses**

**120. Introduction to Plant Pathology** (4) I.

Duniway, Falk; III. Gilbertson, Bostock  
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 102 recommended. The nature, cause, and control of plant diseases.

**\*123. Plant-Virus-Vector Interaction** (3) I. Lucas, Gilbertson, Ullman

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.)

**\*125. Diagnosis and Control of Plant Diseases** (4) III. MacDonald

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in alternate years.

**130. Fungal Biotechnology and Biochemistry**

(3) II. Gilchrist, Bostock  
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and 102 (may be taken concurrently). How fundamental physiological and biochemical activities of fungi impact the destructive and benefi-

cial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications.

**140. Agricultural Biotechnology, Ethics and Public Policy** (4) III. Bruening

Lecture—3 hours; term paper or discussion—1 hour. Examination of agricultural biotechnology within a moral/ethical framework. Public policy development and implementation. GE credit: SciEng, Wrt.

**148. Introductory Mycology** (5) MacDonald, Rizzo

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to morphology, ontogeny, taxonomy and biology of the fungi. (Same course as Plant Biology 148.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**205A-205B. Diseases of Vegetable and Field Crops** (4-1) III-Extra-session summer. van Bruggen

Lecture—2 hours; laboratory—3 hours; fieldwork—6 hours; research term paper. Prerequisite: course 120; Plant Biology 119 or course 125. Study of vegetable and field crops with emphasis on diagnosis, epidemiology, and control. Lectures on diagnostic techniques, seed pathology, disease assessment and crop loss, and integrated disease management. Field trips and laboratory exercises related to disease diagnosis. (Deferred grading only, pending completion of sequence.)

**\*206A-206B. Diseases of Fruit, Nut, and Vine Crops** (3-1) III-Extra-session summer. Kirkpatrick

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.)

**\*208. Ecology of Plant Pathogens and Epidemiology of Plant Diseases** (4) III. Duniway

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.

**\*209. Principles of Plant Disease Control** (3) II. The Staff

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.

**\*210. Biochemistry and Molecular Biology of Plant-Microbe Interaction** (4) I. Gilchrist, Bostock

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.

**215X. Genetics and Molecular Biology of Plant Pathogens** (4) II. Tyler

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.

**\*217. Molecular Genetics of Fungi** (3) II. Holland, Tyler

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.)

**224. Plant Pathogenic Fungi** (5) III. Rizzo

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 148. Advanced topics in the systematics, morphology, and ecology of the fungi. Emphasis on plant pathogenic fungi, although other groups are considered. Offered in alternate years.

**226. Plant Virology** (5) II. Bruening, Falk, Gilbertson

Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

**228. Plant Bacteriology** (5) II. Kirkpatrick, Gilbertson

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.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.)

**290C. Advanced Research Conference** (1) I, II, III. The Staff

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.)

**291. Seminar in Molecular Plant Pathology** (1) I, II. Bostock, Gilchrist, Falk, Gilbertson

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.)

**292. Seminar in Plant Virology** (1) III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (S/U grading only.)

**293. Seminar on Soil Microbiology and Root Diseases** (1) II. VanBruggen, Duniway

Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic based on one or more papers read by the students, and then leads the discussion on this topic. (S/U grading only.)

**294. Seminar on Plant Epidemiology** (1) I. Duniway

Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic, based on one or more papers on plant epidemiology read by the participants, and then leads the discussion on this topic. May be repeated for credit. (S/U grading only.)

**295. Seminar in Mycology** (1) III. Rizzo

(Chairperson in charge)  
Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.)

**298. Special Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

## Plant Physiology

See Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)

## Plant Protection and Pest Management (A Graduate Group)

James D. MacDonald, Ph.D., Acting 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 Plant Protection and 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 chemical applications. Detailed information can be obtained from the Group Chairperson and the application for Graduate Admission and Fellowship.

**Graduate Adviser.** E.P. Caswell-Chen (*Nematology*).

## Courses in Plant Protection and Pest Management (PPP)

### Graduate Courses

**201. Concepts and Systems of Plant Protection and Pest Management** (4) II. Webster (Plant Pathology)

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.

**202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents** (4-4) I. Norris (Weed Science); III. Rosenheim (Entomology)  
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 insects, 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.

- 290. Seminar** (1-2) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)
- 298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)
- 299. Research** (1-12) I, II, III, summer. The Staff (Chairperson in charge)  
(S/U grading only.)

## Plant Science

See **Biological Sciences—Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)**

## Plastic Surgery

See **Medicine, School of**

## Political Science

(College of Letters and Science)

Miroslav Nincic, Ph.D., Chairperson of the Department

Department Office, 1246 Social Sciences and Humanities Building (530-752-0966)

World Wide Web: <http://ps.ucdavis.edu>

### Faculty

Josephine Andrews, Ph.D., Assistant Professor  
 Larry Berman, Ph.D., Professor  
 Scott S. Gartner, Ph.D., Associate Professor  
 John B. Gates, Ph.D., Associate Professor  
 Emily O. Goldman, Ph.D., Associate Professor  
 Stuart L. Hill, Ph.D., Associate Professor  
 Robert W. Jackman, Ph.D., Professor  
 Bruce W. Jentleson, Ph.D., Professor  
 Jeannette Money, Ph.D., Assistant Professor  
 Gabriella R. Montinola, Ph.D., Assistant Professor  
 Miroslav Nincic, Ph.D. Professor  
 Larry I. Peterman, Ph.D., Professor  
 Donald S. Rothchild, Ph.D., Professor  
 Randolph M. Siverson, Ph.D., Professor  
 James F. Spriggs II, Ph.D., Assistant Professor  
 Nayda R. Terkildsen, Ph.D., Assistant Professor  
 Larry L. Wade, Ph.D., Professor  
 Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor (*Political Science, Environmental Science and Policy*), *Academic Senate Distinguished Teaching Award*

### 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 Emeritus  
 Lloyd D. Musolf, Ph.D., Professor Emeritus  
 John R. Owens, Ph.D., Professor Emeritus  
 Paul E. Zinner, Ph.D., Professor Emeritus

## The Major Programs

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     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                           | <b>20</b> |
| Political Science 1 .....                                                                                                                                                         | 4         |
| Two courses from Political Science 2, 3, 4, 5, 7 .....                                                                                                                            | 8         |
| (Course 7 may not be taken if course 5 is taken.)                                                                                                                                 |           |
| Two courses from History 3, 4A, 4B, 4C, 10, 111A, 111B, 111C, 121A, 121B, 121C, 131A, 131B, 131C, 133, 134A, 134B, 145, 146A, 146B, 147A, 147B, 147C, 151A, 151B, 151C, 151D..... | 8         |

#### Depth Subject Matter .....36

Select two courses in each of three fields, listed below. The fields must be chosen from at least two Groups, A, B, or C ...24

##### Group A

Field (1) *Political theory*: Political Science 111–119, 187

##### Group B

Field (2) *American government and institutions*: Political Science 100–109, 171, 173–175, 180–189, 191, 195

Field (3) *Parties and political behavior*: Political Science 160–170

Field (4) *Public law*: Political Science 150–156

##### Group C

Field (5) *Comparative government*: Political Science 126, 140–149, 177–179

Field (6) *International relations*: Political Science 120–139

Additional upper division units in political science to achieve a total of 36.....12

Only 5 units of Political Science 192 (internship) may be counted towards the 36-unit requirement; and Political Science 192A, 192B, or 192W *may not be counted toward a field requirement.*

#### Total Units for the Major .....56

### Political Science—Public Service

#### A.B. Major Requirements:

|                                                     | UNITS     |
|-----------------------------------------------------|-----------|
| <b>Preparatory Subject Matter</b> .....             | <b>12</b> |
| One course from Political Science 1, 5, or 7..      | 4         |
| Two courses from Political Science 2, 3, or 4 ..... | 8         |
| Recommended: Economics 1A–1B.                       |           |

#### Depth Subject Matter .....48

Core program .....12  
 Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 108, 109, 111, 114.

Internship, Political Science 192A, 192B, or 192W.....10

Research paper, Political Science 193 .....2

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 formulation*: Political Science 103, 105, 106, 108, 109, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 173, 174, 175, 195; Economics 130.

Field (2) *Policy implementation and evaluation*: Political Science 156, 180, 181, 182, 183, 187, 188, 189; Economics 131

Field (3) *Policy interpretation—Substance and procedures (public/pre-law)*: Political Science 150, 151, 152, 153, 155, 156.

Field (4) *Policy areas*:

a) Urban policy and implementation: Political Science 100, 101, 102, 191, Economics 125, Environmental Biology and Management 110, Environmental Science and Policy 162, 173.

b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Science and Policy 160, 161, 166, 168A–168B, 179.

c) Environmental policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Political Science–Public Service adviser).

#### Total Units for the Major .....60

**Major Advisers.** Consult Departmental Office.

## Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans.

UNITS

#### Political Science .....24

Select one plan.

**Plan I:** Upper division units in political science (may include 4 units of lower division course work) distributed among at least two of the three Groups, A, B, and C

**Plan II:** a 24-unit plan approved by a faculty adviser. Five units of internship may count toward the minor.

**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 Intern Coordinator, Political Science Department, 1246 Social Sciences and Humanities Building, 752–1989.

**Teacher Credential Subject Representative.** Consult Departmental Office. See also the section on the Teacher Education Program.

**Graduate Study.** The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

**Graduate Adviser.** Consult Departmental Office.

**American History and Institutions.** This University requirement may be satisfied by passing any one of



the following Political Science courses: 1, 5, 100, 101, 102, 103, 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) I.

The Staff; II. Hill; III. The Staff

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.

#### 2. Introduction to Comparative Politics (4) II.

Montinola; III. Andrews

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.

#### 3. International Relations (4) I. Gartner; II.

Nincic; III. Siverson

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.

#### 4. Basic Concepts in Political Theory (4) I.

Peterman

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.

#### 5. Contemporary Problems of the American Political System (4) II. The Staff

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.

#### 7. Contemporary Issues in Law and Politics (4) I. Spriggs

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.

#### \*90X. Lower Division Seminar (4) II. Gartner; III. Siverson

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 100. Local Government and Politics (4) II.

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: 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. GE credit: SocSci, Wrt.

#### \*101. Urban Political Economy (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on ways in which different groups have tried to use local

government authority to achieve their objectives and why they succeeded or failed.

#### \*102. Urban Public Policy (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: 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.

#### \*103. American Federalism (4) I. The Staff

Lecture—3 hours; research paper. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of national-state-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

#### 104. California State Government and Politics (4) I. Wandesforde-Smith

Lecture—3 hours; research paper. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.

#### 105. The Legislative Process (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Analysis of 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) II. The Staff

Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's 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) I. Wandesforde-Smith

Lecture—3 hours; discussion—1 hour. 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) III.

The Staff

Lecture—3 hours; research paper. The 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. GE credit: SocSci, Wrt.

#### 109. Public Policy and the Governmental Process (4) III. Wade

Lecture—3 hours; research paper. 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.

#### \*111. Systematic Political Science (4) II.

The Staff

Lecture/discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

#### 112. Contemporary Democratic Theory (4) II.

Wade

Lecture—3 hours; discussion—1 hour. 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.

**113. American Political Thought (4) I.** The Staff  
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. 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.

#### \*114. Quantitative Analysis of Political Data (4)

III. The Staff

Lecture—3 hours; term paper. 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) III.

Peterman

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 Philosophy (4) I.

The Staff

Lecture/discussion—3 hours; term paper. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated once for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt.

#### \*117. Marxism (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the evolution of Marxism in the nineteenth and twentieth centuries.

#### 118A. History of Political Theory (4) I. Peterman

Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas. GE credit: SocSci, Wrt.

#### 118B. History of Political Theory (4) II.

Peterman

Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke. GE credit: SocSci, Wrt.

#### 118C. History of Political Theory (4) III. The Staff

Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre. GE credit: SocSci, Wrt.

#### 119. Modern Political Thought (4) II. The Staff

The Staff

Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought. Emphasis will be upon an individual philosopher or concept rather than upon a survey of modern political thought.

#### 120. Theories of International Politics (4) I.

The Staff; II. Siverson

Lecture—3 hours; discussion—1 hour. Prerequisite: 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.

#### 121. War (4) I. Siverson

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare. GE credit: SocSci, Wrt.

#### 122. International Law (4) III.

Wandesforde-Smith

Lecture—4 hours. 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) I.

Money; III. The Staff

Lecture—3 hours; term paper. Prerequisite: 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) I.

The Staff

Lecture—3 hours; term paper. Prerequisite: 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.

**126. Ethnic Self-Determination and International Conflict** (4) III. Rothchild

Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course recommended. 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.

**\*127. Nationalism and Imperialism** (4) II.

The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Theory of nation building illustrated by Western and non-Western experience. Offered in alternate years.

**\*128. International Communism** (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movement; ideology organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in alternate years. GE credit: SocSci, Wrt.

**\*129. Special Studies in International Politics**

(4) II, III. The Staff

Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied. GE credit: SocSci, Wrt.

**130. Recent U.S. Foreign Policy** (4) I. Gartner;

III. The Staff

Lecture—3 hours; term paper. Prerequisite: 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) II.

The Staff

Lecture—3 hours; term paper. Prerequisite: 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) I. Goldman; II.

Gartner

Lecture—3 hours; term paper. Prerequisite: 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.

**\*133. The American Role in East Asia** (4) I.

The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on

Asian westernization of U.S. governmental East Asian policy, missionaries, traders, and returning students. Offered in alternate years.

**\*134. Africa and U.S. Foreign Policy** (4) I.

Rothchild

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on nonalignment, producer cartels, multinational corporations, continental integration, and trade and aid relations.

**\*136. Russian Foreign Policy** (4) II. The Staff

Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. The making and implementation of foreign policy after Soviet rule; the legacies of Tsarism and Bolshevism; resources, constraints and capabilities of the "new Russia" in the international system. GE credit: SocSci, Wrt.

**137. International Relations in Western Europe**

(4) I. Money

Lecture—4 hours. Prerequisite: 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.

**\*138. International Relations: East Asia** (4) II.

The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Analysis of international relations and diplomacy in East Asia. Emphasis upon twentieth century problems with examples from China, Japan, Korea, and Southeast Asia.

**\*139. Special Studies in Foreign Policy** (4) I.

Nincic

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated once for credit when topic differs.

**140. Comparative Public Policy** (4) III. The Staff

Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

**\*141. Communist Political Systems** (4) III.

The Staff

Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe. GE credit: SocSci, Wrt.

**142. Politics and Inequality** (4) II. Jackman

Lecture—3 hours; term paper or discussion—1 hour. Examines the linkages between politics and the distribution of social and economic goods. Topics include the impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. GE credit: SocSci, Div.

**\*143. Politics in the Commonwealth of Independent States and the Baltic** (4) III.

The Staff

Lecture/discussion—4 hours. Prerequisite: course 2 and upper division standing. Creation of new political and economic structures in newly independent states; departures from central planning; dilemmas of cooperation; analysis of divergent reform strategies; integration into international political and economic system.

**144. Russian Politics and Policy** (4) II. Andrews

Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule.

**\*145. Government and Politics in Emergent Nations** (4) III. The Staff

Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in alternate years.

**\*146. Contemporary African Politics** (4) II.

Rothchild

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of party systems, military coups, bureaucracy, regional integration, and disintegration, and economic development in Africa south of the Sahara.

**\*147. Politics and Policy in Western Europe** (4)

III. Money

Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.

**148A. Government and Politics in East Asia:****China** (4) I. Montinola

Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy.

**\*148B. Government and Politics in East Asia:****Pacific Rim** (4) III. The Staff

Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and establishment of political institutions in selected countries of the Pacific Rim, namely Japan, Korea, Taiwan. Emphasis on post World War II.

**148C. Government and Politics in East Asia:****Southeast Asia** (4) II. Montinola

Lecture—3 hours; term paper. Prerequisite: course 2 recommended. Evolution of political culture, institutions, economy of selected nations in Southeast Asia including Vietnam plus two or three other examples. Emphasis on imperialist legacy, nation building in multi-ethnic communities, contrasts between socialist and non-socialist development models. Offered in alternate years.

**\*149. Politics of Development in Africa** (4) III.

Rothchild

Lecture/discussion—4 hours. Prerequisite: course 134 recommended. Analysis of the developmental process in sub-Saharan Africa. Emphasis will be placed upon state and state institution, state-society relations, ethnicity, socioeconomic class, women, ideology, party systems, bureaucracy, military and developmental choices.

**150X. Judicial Politics and Constitutional****Interpretation** (4) II. Gates; III. Spriggs

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking; issues surrounding constitutional interpretation and decision making; prerequisite for courses on the politics of constitutional law.

**151. The Constitutional Politics of the First****Amendment and the Right to Privacy** (4) III.

Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. 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.

**\*152. The Constitutional Politics of Equality** (4)

III. Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. 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, Div, Wrt.

**153. The Constitutional Politics of the Justice****System** (4) II. Spriggs

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of the American criminal justice system; the 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.

**154. Legal Philosophy** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law; law as an instrument of social con-

trol and the relationship between law and morality. Offered in alternate years.

**155. Judicial Process and Behavior (4) III.**

Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: 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 decision-making bodies. Offered in alternate years. GE credit: SocSci, Wrt.

**160. American Political Parties (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. 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.

**161. Comparative Political Parties (4) II.**

Andrews

Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties especially in Great Britain and France but with some reference to other Western European countries.

**162. Elections and Voting Behavior (4) III.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. GE credit: SocSci, Wrt.

**163. Group Politics (4) I.** Wade

Lecture—3 hours; discussion—1 hour. 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.

**164. Public Opinion (4) I.** The Staff

Lecture—3 hours; 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) III.** Terkildsen

Lecture—3 hours; discussion—1 hour. 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) II.** Terkildsen

Lecture—3 hours; discussion—1 hour or seminar—1 hour. 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.

**\*167. Political Socialization (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor. Who learns what about politics, and when and how they learn it. The process, content and sources of political learning, particularly in preadulthood, and the significance of such factors for the political system as well as for the development of the political self.

**\*168. Chicano Politics (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment. GE credit: SocSci, Div.

**\*169. Political Elites (4) I, II.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 4, or consent of instructor. Back-

ground, careers, motives and beliefs of political leaders. Place of elites in a democratic polity; elite-mass differences; conflict and consensus among elites. GE credit: SocSci, Div, Wrt.

**170. Political Psychology (4) II.** Terkildsen

Seminar—3 hours; term paper. Prerequisite: course 1 or the equivalent. Social psychological theories of how voters form political attitudes and to what extent such attitudes translate into behaviors.

**\*171. The Politics of Energy (4) II.**

Wandesforde-Smith

Lecture/discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of political processes for making energy choices at the international, national and state levels. Emphasizes interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation.

**\*172. American Political Development (4) II.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: 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. Topics may include democratization, cultural change, party formation, state-building, constitutionalism, race relations.

**\*173. Community Power and Change (4) II.**

Jackman

Lecture—3 hours; discussion—1 hour. An examination of the relationship between general community characteristics, the distribution of political power, and policy outputs in the United States. Alternative models of community political change are presented.

**\*174. Government and the Economy (4) II.**

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: 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.

**175. Science, Technology, and Policy (4) III.** Hill

Lecture—3 hours; discussion—1 hour. 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) III.** Terkildsen

Seminar—3 hours; term paper. Prerequisite: Course 1 or equivalent. Race, racial attitudes and racial policies in the United States with a specific emphasis on African Americans. GE credit: SocSci, Div.

**\*177. Modern Dictatorships (4) III.** The Staff

Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Selected political processes and institutions of dictatorships in Germany, Italy, Russia, Spain, Japan, and other states. Topics include executives, legislatures, parties, courts, bureaucracies, communications, and public opinion with comparisons to U.S. processes.

**178. Political Development in Modernizing Societies (4) I.** Jackman

Lecture—3 hours; discussion—1 hour. 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.

**179. Special Studies in Comparative Politics (4) III.** Montinola

Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to comparative politics. May be repeated once for credit.

**\*180. Bureaucracy in Modern Society (4) II.**

Wandesforde-Smith

Lecture—3 hours; discussion—1 hour. Prerequisite: 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.

**\*181. The American Administrative System (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Introduction to the development and organization of administrative institutions in the American federal system; focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels. GE credit: SocSci, Wrt.

**\*182. Administrative Decision Making and Public Policy (4) II.** The Staff

Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform. GE credit: SocSci, Wrt.

**\*183. Administrative Behavior (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

**187. Administrative Theory (4) III.** Hill

Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucracies in the total society. GE credit: SocSci, Wrt.

**\*188. Manpower Policy and Personnel Administration (4) III.** The Staff

Lecture—3 hours; discussion—1 hour. Politics and economics of effective manpower programs; planning manpower needs; recruitment, selection, and administration of public personnel; training and development; unions and collective bargaining; affirmative action; ethics and morality in the public service.

**\*189. Politics of Budgeting and Finance Administration (4) III.** The Staff

Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society; politics of revenue and resource allocation; tax policy; inter-governmental financial relations; budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

**190. International Relations (4) II.** Money

Lecture—2 hours; discussion—2 hours. Prerequisite: 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.

**\*191. Special Studies in Local Government and Politics (4) III.** The Staff

Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor; enrollment limited to advanced students. Intensive study of one or more topics relating to urban policy and politics, designed for advanced students. Group projects and fieldwork in one or more communities are emphasized.

**192A. Internship in Public Affairs (5) I, II, III.**

Wandesforde-Smith (Chairperson in charge) 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) I, II, III.**

Wandesforde-Smith (Chairperson in charge) 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** (6-8) I, III. Jentleson and staff  
Internship—30-35 hours. Prerequisite: junior or senior standing and admission into the UC Davis Washington Center undergraduate program. Internship in Washington, D.C. with associated research project, under the supervision of a faculty sponsor. (P/NP grading only.)

**193. Research in Practical Politics** (2) I, II, III. The Staff  
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.

**193W. Washington Center Research Project** (3) I, III. Staff  
Lecture/discussion—3 hours; independent study—3 hours; tutorial—0.5 hours. Prerequisite: concurrent enrollment in course 192W. Core academic component of Washington Program. Topics coordinated with internships, and research draws on resources uniquely available in Washington. Supervised preparation of extensive paper.

**194HA-194HB-194HC. Special Study for Honors Students** (2-3-5) I, II, III. The Staff  
Directed research. Prerequisite: major in Political Science or Political Science–Public Service with junior standing and overall GPA of 3.5. 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.)

**195. Special Studies in American Politics** (4) II. Wandesforde-Smith; III. Wade  
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 once for credit when topic differs.

**198. Directed Group Study** (1-5) II. Andrews (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

**\*201. Urban Government and Politics** (4) III. The Staff  
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) I. The Staff  
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) III. The Staff  
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.

**\*203B. American Government: Congress** (4) I. The Staff  
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.

**203C. American Government: Courts** (4) II. Gates  
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.

**\*205. Field Research in Urban Politics and Policy** (4) III. The Staff  
Seminar—2 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

**\*207. Environmental Public Policy** (4) II. Wandesforde-Smith  
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) I. Hill  
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.

**\*209. The American Political System** (4) III. Wade  
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

**211. Research Methods in Political Science** (4) I. Jackman  
Seminar—4 hours. Prerequisite: Statistics 13; graduate standing or permission of instructor. Introduction to philosophy of science, research design for experimental and quasi-experimental settings, and data analysis. Topics include: logic of empirical research, measurement problems, research design, sampling, descriptive statistics, tabular analysis, measures of association, and introduction to correlation and regression.

**212. Quantitative Analysis in Political Science** (4) II. Money  
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.

**213. Quantitative Analysis in Political Science II** (4) III. Andrews  
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.).

**214A-214B. Research in Political Science** (2-2) I, III. The Staff  
Seminar—2 hours. Prerequisite: courses 211, 212. 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.)

**215. Introduction to Modeling Political Behavior** (4) II. Gartner  
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.

**\*216. Case Study Methods** (4) III. Goldman  
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 complements experimental, statistical and deductive modes of research. Offered in alternate years.

**\*217. Social Choice Theory and Spatial Modeling** (4) II. Andrews  
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) II. The Staff  
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.

**219A. Political Theory Sequence** (4) II. Peterman  
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.

**219B. Political Theory Sequence** (4) III. The Staff  
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.

**223. International Relations** (4) II. The Staff  
Seminar—3 hours; term paper.

**225. The International System** (4) III. Siverson  
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.

**230. American Foreign Policy** (4) I. Nincic  
Seminar—3 hours; term paper.

**231. U.S. Political Culture and Foreign Relations** (4) III. Rothchild  
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.

**\*241. Communist Political Systems** (4) III. The Staff  
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) II. Jackman  
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) I. Andrews  
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) II. Rothchild  
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of poli-

cymaking 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.

**\*248. Politics of East Asia** (4) III. The Staff Seminar—3 hours; term paper. Selected contemporary problems of government and international relations in East Asia.

**250. Policy Development and Impact in U.S. Courts** (4) III. Spriggs

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) I. The Staff Seminar—3 hours; term paper. Survey of selected topics in American and comparative parties.

**261. Political Behavior** (4) II. Terkildsen Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.

**\*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.

**\*282. Concepts and Problems in Public Administration** (4) I. The Staff

Seminar—4 hours. Nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in alternate years.

**\*283. Organizational Behavior** (4) II. The Staff Seminar—4 hours. Organizational behavior as it relates to public sector decision making.

**\*286. Administrative Values** (4) III. The Staff Seminar—3 hours; term paper. Examination of American administrative values. Offered in alternate years.

**290A. Research in American Government and Public Policy** (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

**290B. Research in Political Theory** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

**290C. Research in International Relations** (4) III. Money

Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

**290D. Research in Judicial Politics** (4) I, II, III. The Staff

Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

**290E. Research in Political Parties, Politics, and Political Behavior** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior.

**290F. Research in Comparative Government and Policy** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

**290G. Research in Public Administration** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

**297. Internships in Political Science** (2) I, II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Directed Reading** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Course**

**390. The Teaching of Political Science** (1) I, II, III. The Staff

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.)

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Pomology

(College of Agricultural and Environmental Sciences)  
T. M. DeJong, Ph.D., Chairperson of the Department  
Department Office, 1035 Wickson Hall  
(530-752-0123)

World Wide Web: <http://pom.ucdavis.edu>

**Faculty**

Fredrick A. Bliss, Ph.D., Professor  
Patrick H. Brown, Ph.D., Associate Professor  
Carlos H. Crisosto, Ph.D., Lecturer  
Abhaya M. Dandekar, Ph.D., Associate Professor  
Theodore M. DeJong, Ph.D., Professor  
Louise Ferguson, Ph.D., Lecturer  
Thomas M. Gradziel, Ph.D., Associate Professor  
Scott Johnson, Ph.D., Lecturer  
Adel A. Kader, Ph.D., Professor  
John M. Labavitch, Ph.D., Professor  
Gale McGranahan, Ph.D., Lecturer  
Elizabeth J. Mitcham, Ph.D., Lecturer  
Dan E. Parfitt, Ph.D., Lecturer  
Vito S. Polito, Ph.D., Professor  
Daniel Potter, Ph.D., Assistant Professor  
Kenneth A. Shackel, Ph.D., Associate Professor  
Douglas V. Shaw, Ph.D., Associate Professor  
Stephen M. Southwick, Ph.D., Lecturer  
Ellen G. Sutter, Ph.D., Professor  
Steven A. Weinbaum, Ph.D., Professor

**Emeriti Faculty**

Royce S. Bringhurst, Ph.D., Professor Emeritus  
Dillon S. Brown, Ph.D., Professor Emeritus  
Robert M. Carlson, Ph.D., Lecturer Emeritus  
Peter B. Catlin, Ph.D., Lecturer Emeritus  
Julian C. Crane, Ph.D., Professor Emeritus  
William H. Griggs, Ph.D., Professor Emeritus  
Paul E. Hansche, Ph.D., Professor Emeritus  
Dale E. Kester, Ph.D., Professor Emeritus  
George C. Martin, Ph.D., Professor Emeritus  
Warren C. Micke, M.S., Lecturer Emeritus  
F. Gordon Mitchell, M.S., Lecturer Emeritus  
David E. Ramos, Ph.D., Lecturer Emeritus  
Roger J. Romani, Ph.D., Professor Emeritus  
Kay Ryugo, Ph.D., Professor Emeritus  
Noel F. Sommer, Ph.D., Lecturer Emeritus  
Kiyoto Uriu, Ph.D., Professor Emeritus

**Related Major Programs.** See the majors in Plant

Biology, Agricultural Systems and Environment, Crop Science and Management, and Biotechnology.

**Related Courses.** Pomology faculty also teach the following courses that contribute to majors and graduate programs in Agricultural Systems and Environment, Horticulture, and Plant Biology:

Agricultural Systems and Environment 1, 98, 107, 170A, 170B, Biological Sciences 1C, Horticulture 203, Hydrologic Science 124, Integrated Studies 9, Plant Biology 119, 144, 151, 153, 158, 160, 161A, 161B, 171, 172, 172L, 173, 174, 175, 196, 201, 202, 208, 212, 214, 290A, 291, 293, Science and Society 90C, 90X.

**Graduate Study.** For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Studies chapter of this catalog.

## Courses in Pomology (POM)

### Lower Division Courses

**10. Fruits and Nuts of California and the World** (3) II. Polito

Lecture—3 hours; one field trip on seventh Saturday of the quarter. Biological and environmental principles of fruit and nut crop production emphasizing California's tree crop industries. Topics include temperate and subtropical species and cultivars, biotechnology and genetic improvement, environmental physiology, plant and crop growth, pest control, harvest and storage and consumer issues. GE credit: SciEng, Wrt.

**92. Internship in Pomology** (1-12) I, II, III.

The Staff (Chairperson in charge)  
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

### Upper Division Courses

**192. Internship in Pomology** (1-12) I, II, III.

The Staff (Chairperson in charge)  
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

**210. Plant Reproductive Morphology** (4) III.

Polito  
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105, or Botany 111A and 111B. Biology and morphology of flowering plant sexual reproduction. Specific topics include evocation, floral transition and organogenesis, ovule and pollen development, pollination, self-incompatibility, fertilization, fruit set and fruit morphology. Emphasis on species of pomological interest.

**212. Postharvest Biology and Biotechnology of Fruits and Nuts** (3) III. Kader, Mitcham

Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of postharvest biology of fruits and nuts in relation to biotechnological procedures used in handling, emphasizing research needs. Offered in alternate years.

**220. Quantitative Genetics and Selection Theory** (3) II. Shaw

Lecture—3 hours. Prerequisite: Animal Genetics 107, Plant Science 113, Agronomy 205A. Theory and application of quantitative genetic principles to the breeding, testing, and selection of horticultural crop plants. Topics include: heritability, selection using information from relatives, indirect selection, genetic correlations, multiple trait selection, inbreeding, crop stability, and field testing.

**221. Principles and Practices of Line Cultivar Breeding** (3) III. Bliss

Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113, Agronomy 205A. Application of genetic principles and selection theory to the production and testing of inbred lines in self- and cross-pollinated crops. Topics include types of cultivars, genetic parameters of inbreeding populations and breeding methods to produce superior inbreds. Offered in alternate years.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**299. Research** (1-12) I, II, III, Summer. The Staff (Chairperson in charge)  
(S/U grading only.)

## Population Biology (A Graduate Group)

John Gillespie, Ph.D., Chairperson of the Group  
Group Office, 2320 Storer Hall (530-752-8523)

World Wide Web: <http://www-eve.ucdavis.edu/popbio.htm>

**Faculty.** Includes 35 members from the Division of Biological Sciences; and the Departments of Anthropology; Agronomy; Entomology; Environmental Science and Policy; Geology; Philosophy; and Wildlife, Fish and Conservation Biology.

**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.

### Courses in Population Biology (PBG)

#### Graduate Courses

**200A. Principles of Population Biology** (5) I. Gillespie, Toft

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.

**200B. Principles of Population Biology** (6) II. Chesson, Strauss, Strong

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.

**200C. Principles of Population Biology** (6) III. Sanderson, Shaffer

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.

**203. Advanced Evolution** (3) III. Gottlieb

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) II. Rosenheim

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. Offered in alternate years. (Same course as Entomology 206.)

**\*209. Molecular Evolution** (3) II. Langley, Nuzhdin

Lecture—3 hours. Prerequisite: Biological Sciences 103; Evolution and Ecology 100 recommended. Evolution from the molecular standpoint, including the evolution of genome structure and the organization of single genes and gene clusters, evolution of enzymes and metabolic pathways, molecular clocks, transposons and other movable genetic elements, and molecular polymorphisms. Offered in alternate years. (S/U grading only.)

**\*212. Topics in Invertebrate Evolution** (2) III. Grosberg

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.)

**224. Field Reconnaissance for Population Biologists** (2) I, II, III. The Staff (Chairperson in charge)

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) III. Karban

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.)

**231. Mathematical Methods in Population Biology** (3) I. Hastings

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.)

**270. Research Conference in Evolutionary Biology** (1) I. The Staff (Chairperson in charge)

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.)

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by visiting lecturers, UCD graduate students and faculty. May be repeated for credit. (S/U grading only.)

**290C. Research Conference in Population Biology** (1) I, II, III. The Staff

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.)

**292. Topics in Ecology and Evolution** (1) I, II, III. Staff (Chairperson in charge)

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.)

**296. Seminar in Geographical Ecology** (2) III. Shapiro

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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

## Population Health and Reproduction

(School of Veterinary Medicine)

Robert H. Bondurant, D.V.M., Chairperson of the Department

Department Office, 1114 Tupper Hall  
(530-752-1358; Fax: 530-752-4278)

World Wide Web: <http://www.vetmed.ucdavis.edu/PHR/phr1.htm>

#### Faculty

Barry A. Ball, D.V.M., Ph.D., Professor, John Hughes  
Endowed Chair in Equine Reproduction

Robert H. Bondurant, D.V.M., Professor  
Bruno B. Chomel, D.V.M., Ph.D., Associate Professor  
Dean O. Cliver, Ph.D., Professor

Alan J. Conley, D.V.M., Ph.D., Assistant Professor  
James A. Cullor, D.V.M., Ph.D., Professor  
Thomas B. Farver, Ph.D., Professor

Lynette A. Hart, M.A., Ph.D., Associate Professor  
Charles A. Holmberg, D.V.M., Ph.D., Professor  
Phillip H. Kass, D.V.M., Ph.D., Associate Professor  
Kenneth M. Lam, Ph.D., Professor

Bill L. Lasley, Ph.D., Professor  
Irwin K. M. Liu, D.V.M., Ph.D., Professor

James Murray, Ph.D., Professor (*Population Health and Reproduction, Animal Science*)

Joan D. Rowe, D.V.M., Ph.D., Associate Professor  
William M. Sischo, D.V.M., Ph.D., Assistant Professor  
Patricia S. Wakenell, D.V.M., Ph.D., Associate Professor

#### Emeriti Faculty

Domenico Bernoco, D.V.M., Libera Docenza,  
Associate Professor Emeritus

Charles E. Franti, Ph.D., Professor Emeritus  
Constantin Genigeorgis, D.V.M., Ph.D., Professor  
Emeritus

Charles A. Hjerpe, D.V.M., Professor Emeritus  
Jack A. Howarth, D.V.M., Ph.D., Professor Emeritus

Richard H. McCapes, D.V.M. Senior Lecturer  
Emeritus

Margaret E. Meyer, Ph.D., Professor Emeritus  
Hans P. Riemann, D.V.M., Ph.D., Professor Emeritus  
Calvin W. Schwabe, D.V.M., M.P.H., Sc.D., Professor  
Emeritus

Clyde J. Stormont, Ph.D., Professor Emeritus  
Richard Yamamoto, Ph.D., Professor Emeritus



**Affiliated Faculty**

Edward R. Atwill, D.V.M., Ph.D., Assistant Agronomist/  
Assistant Cooperative Extension Specialist  
Ann Trommershausen Bowling, Ph.D., Adjunct  
Professor  
Richard P. Chin, D.V.M., Assistant Professor of  
Clinical Diagnostic Veterinary Medicine  
Phillip W. Jardon, D.V.M., M.P.V.M., Lecturer  
Joan J. Jeffrey, D.V.M., M.S., Assistant Agronomist/  
Assistant Cooperative Extension Specialist  
Theodore W. Jones, Ph.D., Lecturer  
Jay F. Kirkpatrick, Ph.D., Associate Adjunct Professor  
Donald J. Klingborg, D.V.M., Lecturer  
Nicholas W. Lerche, D.V.M., M.P.V.M., Associate  
Adjunct Professor  
George B. E. West, D.V.M., M.P.V.M., Lecturer  
Peter R. Woolcock, B.Sc., Ph.D., Assistant Professor  
of Clinical Diagnostic Virology

**Courses in Population Health and Reproduction (PHR)**

**Lower Division Course**

**92. Internship in Veterinary Science** (1-4) I, II, III. The Staff (Chairperson in charge)  
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) II. Hart  
Lecture—2 hours. 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.

**111. Animal Hygiene** (3) II. West  
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

**150. Food-Borne Infections and Intoxications** (4) III. Cliver  
Lecture—4 hours. Prerequisite: Food Science and Technology 104, Veterinary Microbiology and Immunology 127. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

**192. Internship in Veterinary Science** (1-12) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**202. Sampling in Health-Related Research** (3) II. Farver  
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.

**\*203. Multivariate Biostatistics** (3) II. Farver  
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 regres-

sion, 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.

**210A. Analytic Epidemiology I: Case Control Studies** (3) II. Kass  
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 Epidemiology 210A.)

**210B. Analytic Epidemiology II: Cohort Studies** (3) III. Kass  
Lecture/discussion—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 Epidemiology 210B.)

**212. Epidemiology of the Zoonoses** (4) II. Chomel  
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or third-year standing in 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.

**216A. Immunodiagnostic Techniques** (2) II. Lam  
Lecture—10 sessions; laboratory—10 sessions. Prerequisite: MPVM student or consent of instructor. Applications of serologic techniques for diagnosis of animal diseases.

**220. Advanced Avian Medicine** (3) III. Wakenell, Lam  
Lecture—3 hours. Instruction on the methods of prevention of the major diseases of domestic poultry.

**225. Preventive Avian Medical Practice** (3) II. West, Wakenell  
Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MPVM program, third- or fourth-year standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries, and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

**\*231. Pathophysiology of Mammalian Reproductive Processes** (3) III. Conley  
Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in alternate years.

**290A. Seminar** (1) I, II, III. Liu  
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.)

**290B. Current Topics in Avian Medicine** (1) I, II, III. Lam, Wakenell  
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation. May be repeated for credit.

**292. Current Topics In Reproduction** (1) I, II, III. Lasley  
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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (S/U grading only.)

**Professional Course**

**397T. Tutoring in Veterinary Population Health and Reproduction** (1-5) I, II, III. The Staff  
Lecture—1 hour; laboratory—3 hours; discussion—2 hours. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

**Professional Courses**

**404. Medical Statistics III** (4) II. Farver  
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Preventive Veterinary Medicine 403. Continuation of Preventive Veterinary Medicine 403. Analysis of covariance, variable selection; analysis of multiway frequency tables; logistic regression; discriminant analysis; time dependent variation and trends; biomedical applications.

**\*411. Disease Control and Eradication** (3) III. Riemann  
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Veterinary Medicine 409 or Preventive Veterinary Medicine 405. Studies of various approaches to control/eradicate diseases in animal populations. Design and economic evaluation of control programs.

**\*420. Zoonoses of Non-Human Primates** (2) II. Chomel  
Lecture—2 hours. Prerequisite: second-, third-, or fourth-year standing in the School of Veterinary Medicine or Medicine or consent of instructor. 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.

**421. Veterinary Public Health** (3) III. Chomel  
Lecture/discussion—3 hours. Broad coverage of the various functions of the veterinary profession towards human health with special emphasis on zoonoses and major livestock diseases prevention and control, food safety and hygiene and new environmental issues as well as animal welfare.

**429B. Dairy Herd Health Management** (4) III. The Staff  
Lecture—40 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

**430. Issues in Animal Production and Resource Utilization** (2) I. The Staff  
Lecture—10 sessions; discussion/laboratory—three 5-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to interfaces of food animal production and environmental protection, wildlife preservation, animal well-being, food safety and human nutrition. Site visits to wildlife preserves, livestock production and processing facilities. (S/U grading only.)

**432. Reproductive Technology in Mammals and Birds** (0.7) III. BonDurant  
Lecture—7 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 a limited extent. A goal is to expose students to some of the "sexier" aspects of population/reproductive management. (S/U grading only.)

**432L. Reproductive Technology in Mammals and Birds, Laboratory** (0.3) III. BonDurant  
Laboratory—3 sessions. Prerequisite: course 432 concurrently. Laboratory demonstrations and exer-

\*Course not offered this academic year.

cises 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.)

**\*439. Beef Cattle Nutrition** (1) III. The Staff  
Lecture—10 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Economically sound methods for meeting nutrient requirements of feedlot and pasture beef cattle (including computer-assisted methods). Strategies for presenting nutritional and ration-associated diseases of beef cattle.

**442. Equine Theriogenology** (2) II. Liu  
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. 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.

**442L. Equine Theriogenology Laboratory** (1) II. Liu  
Laboratory—3 hours. Prerequisite: third year standing in School of Veterinary Medicine or consent of instructor. Hands-on diagnosis and implementation of techniques related to reproductive examination of horses. Routine and current procedures performed on the farms. Designed to maximize the opportunity for assessment of the normal reproductive anatomy, the diagnosis and interpretations of physiologic conditions and for becoming comfortable in performing the various routine procedures.

**445. Food Animal Theriogenology and Reproductive Performance** (2) II. BonDurant  
Lecture—2 hours. Prerequisite: Veterinary Medicine 446 with a grade of C or better, or consent of instructor. Physiologic, pathophysiological, and management factors affecting the reproductive health and performance of food animals, with emphasis on dairy and beef cattle, and sheep. Minor emphasis on swine and goats. Assessment of, and intervention strategies for, herd reproductive performance.

**445L. Food Animal Theriogenology Laboratory** (1) II. BonDurant  
Laboratory—3 hours. Prerequisite: course 445 concurrently. 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.)

**446A. Food Animal Reproduction** (1) III. Rowe  
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

**446B. Equine Reproduction** (1) III. Liu  
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings.

**446C. Reproduction of Non-Domestic Animals** (1) III. Lasley  
Lecture—10 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Follows course 446A and provides 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.

**450. HACCP and Risk Assessment in Pre- and Postharvest Food Safety** (3) II. Cliver  
Lecture/discussion—3 hours. Prerequisite: a first year course in microbiology or food science or consent of instructor. Application of the Hazard Analysis-Critical Control Point (HACCP) system in the food industry, for regulatory agencies; and in the preharvest area of food production. Development of HACCP plans. (S/U grading only.)

**483. Pet Loss Support Rounds** (1-2) I, II, III, IV. Hart

Discussion/laboratory—3-6 hours. Prerequisite: veterinary student status. Training and experience in responding to pet loss hotline callers who are experiencing grief associated with an animal's death. Students gain proficiency in supportive listening and referral to community resources and increase effectiveness in dealing with upset pet owners. (S/U grading only.)

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## 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 Applied Biological Systems Technology 134, Agricultural Systems and Environment 120 or Statistics 100, Agricultural Systems and Environment 110A or Plant Biology 112, Environmental and Resource Sciences 186, Soil Science 109 .....10

**Minor Advisers.** S.K. Upadhyaya, D.K. Giles.

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## Preventive Veterinary Medicine (A Graduate Program)

Group Office, 125 Surge IV (530-752-1383)

**Graduate Study.** The School of Veterinary Medicine offers a program of study and research leading to the Master's degree in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing the Director, Office of the Dean, School of Veterinary Medicine.

**Director.** Ian A. Gardner (Medicine and Epidemiology).

### Courses in Preventive Veterinary Medicine (MPM)

#### Professional Courses

**402. Medical Statistics I** (4) IV. Farver  
Lecture—3 hours; laboratory—2 hours. 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.

**403. Medical Statistics II** (4) I. Farver  
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 402 or the equivalent. 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.

**405. Principles of Epidemiology** (5) I. Hird  
Lecture—3 hours; discussion—2 hours. Prerequisite: course 402 or consent of instructor. Measuring disease, disease in populations, outbreak investigation, properties of tests, risk analysis, and descriptive and cross-sectional epidemiologic studies.

**405L. Epidemiology Laboratory** (3) I. Case  
Laboratory—6 hours; lecture—1 hour. Prerequisite: grade of C or better in courses 402, 405, and 412 (may be taken concurrently). Course will integrate and reinforce concepts of epidemiology, statistics and microcomputer applications, using a problem-solving approach with examples from livestock health, public health, and wildlife health. Applications of the Epi Info, spreadsheet and database manager software programs.

**406. Epidemiologic Study Design** (4) II. Hird  
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: grade of C or better in course 405 or the equivalent and consent of instructor. Clinical trials: objectives, random assignment of treatment, outcome, masking, and sample size calculations. Observational cohort studies: objectives, cohort and outcome selection, confounding and bias. Case-control studies: objectives, selection of cases and controls, bias.

**408. Veterinary Research: Planning and Reporting** (3) I. Thurmond  
Lecture—26 sessions; laboratory—4 sessions. Prerequisite: course 402 or Statistics 102 with a grade of B- or better, and courses 412 and 405 (may be taken concurrently). Provides M.P.V.M. students and graduate students with guidelines of critical thinking, logistics, and organization that will help them undertake and communicate their research project.

**412. Introduction to Information Management** (3) IV. Sischo  
Lecture—1 hour; laboratory—6 hours. Basic knowledge and skills in microcomputer hardware, DOS commands, word processing, spreadsheets and communications packages. (S/U grading only.)

**426. Applied Epidemiologic Problem Solving** (1) II. Gardner  
Laboratory—3 hours. Prerequisite: grade of C or better in course 405L. 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.

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## Psychiatry

See Medicine, School of

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## Psychology

(College of Letters and Science)

Sally P. Mendoza, Ph.D., Chairperson of the Department

Department Office, 135 Young Hall (530-752-1880)

World Wide Web:

<http://psychology.ucdavis.edu/default.html>

#### Faculty

Linda P. Acredolo, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
John P. Capitanio, Ph.D., Assistant Professor  
Leo M. Chalupa, Ph.D., Professor  
Richard G. Coss, Ph.D., Professor

## 402 Psychology

Alan C. Elms, Ph.D., Professor  
 Robert A. Emmons, Ph.D., Professor  
 Karen P. Ericksen, Ph.D., Professor  
 Gail S. Goodman, Ph.D., Professor  
 Albert A. Harrison, Ph.D., Professor  
 Kenneth R. Henry, Ph.D., Professor  
 Joel T. Johnson, Ph.D., Professor  
 Neal E.A. Kroll, Ph.D., Professor  
 Leah A. Krubitzer, Ph.D., Assistant Professor  
 Debra L. Long, Ph.D., Associate Professor  
 George R. Mangun, Ph.D., Associate Professor  
 Sally P. Mendoza, Ph.D., Professor  
 Bruno A. Olshausen, Ph.D., Assistant Professor  
 Donald H. Owings, Ph.D., Professor  
 Theodore E. Parks, Ph.D., Professor  
 Robert B. Post, Ph.D., Professor  
 Richard W. Robins, Ph.D., Assistant Professor  
 Phillip R. Shaver, Ph.D., Professor  
 Dean K. Simonton, Ph.D., Professor, *UC Davis Prize for Teaching and Scholarly Achievement*  
 Robert Sommer, Ph.D., Professor  
 Stanley Sue, Ph.D., Professor  
 Carol Tomlinson-Keasey, Ph.D., Professor  
 Niels G. Waller, Ph.D., Associate Professor  
 Andrew P. Yonelinas, Ph.D., Assistant Professor

### Emeriti Faculty

Jarvis R. Bastian, Ph.D., Professor Emeritus  
 William F. Dukes, Ph.D., Professor Emeritus  
 Joseph Lyons, Ph.D., Professor Emeritus  
 Peter R. Marler, Ph.D., Professor Emeritus  
 William A. Mason, Ph.D., Professor Emeritus  
 G. Mitchell, Ph.D., Professor Emeritus  
 Robert M. Murphey, Ph.D., Professor Emeritus  
 Thomas Natsoulas, Ph.D., Professor Emeritus  
 Charles T. Tart, Ph.D., Professor Emeritus

### Affiliated Faculty

Jacqueline Horn, Ph.D., Lecturer

## The Major Programs

Psychology provides knowledge of and means of studying human and animal behavior.

**The Program.** The department offers the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program for students with an interest in either biology or mathematics. The psychology program is extremely broad and represents a wide variety of topics. The courses are organized around three focal points. *Personality/Social* emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. *Psychobiology* emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. *Perception/Cognition* emphasizes how information from the physical world is sensed, perceived, and used, and examines the roles of consciousness, language, perception, and learning in behavior.

**Preparatory Requirements.** Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.50. All courses must be taken for a letter grade. (Students in the Bachelor of Science, Biology program must complete Biological Sciences 1A.):

|                                                                                                                                                                                       |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Psychology 1, 41 .....                                                                                                                                                                | 8 units      |
| Statistics 13 or 102 .....                                                                                                                                                            | 4 units      |
| Biological Sciences 1A<br>or<br>Biological Sciences 10 and one course<br>from Anthropology 1, Molecular and Cellular<br>Biology 10, Neurobiology, Physiology and<br>Behavior 10 ..... | 5 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        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                     | <b>21-25</b> |
| 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 1A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology and Behavior 10 ..... | 5-8          |
| One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units .....                                                                                 | 4-5          |
| <b>Depth Subject Matter</b> .....                                                                                                                                                           | <b>40</b>    |
| Two courses from two of the following three groups and one course from the remaining group .....                                                                                            | 19-22        |
| Group A: Psychology 100, 130, 131, 132, 133, 135                                                                                                                                            |              |
| Group B: Psychology 101, 108, 113, 129, 134, 150, 152, 160                                                                                                                                  |              |
| Group C: Psychology 112 (or Human Development 100A or 100B), 143, 145, 147, 168                                                                                                             |              |
| Additional units to achieve a total of 40 upper division units in psychology .....                                                                                                          | 18-20        |
| (A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)                                                           |              |
| <b>Total Units for the Major</b> .....                                                                                                                                                      | <b>61-65</b> |

## B.S. Major Requirements:

|                                                                                                                                   | UNITS        |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Biology Emphasis</b>                                                                                                           |              |
| <b>Preparatory Subject Matter</b> .....                                                                                           | <b>52-61</b> |
| 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 21A-21B .....                                                                                              | 6-8          |
| Physics 10 or 7A-7B .....                                                                                                         | 4-8          |
| Biological Sciences 1A, 1B .....                                                                                                  | 10           |
| 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          |
| <b>Depth Subject Matter</b> .....                                                                                                 | <b>49</b>    |
| Seven Psychology courses distributed as specified:                                                                                |              |
| Group A: two courses from 100, 130, 131, 132, 133, 135 .....                                                                      | 8            |
| Group B: three courses from 101, 108, 113, 129, 134, 150, 152, 160 .....                                                          | 12-15        |
| Group C: two courses from 112 (or Human Development 100A or 100B), 143, 145, 147, 168 .....                                       | 8            |
| Additional units to achieve a total of 40 upper division units in psychology .....                                                | 9-12         |
| (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**  
 (Biology Emphasis) .....

**101-110**

### Recommended

Psychology 180B, 199 (on a psychobiological topic), Anthropology 154A, Environmental Science and Policy 110, Evolution and Ecology 100, 101.

### Mathematics Emphasis

|                                                                                                                                                                                             | UNITS         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                     | <b>44-58</b>  |
| 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 Engineering 5 .....                                                                                                                                      | 3             |
| Chemistry 10 or 2A-2B or 2AH-2BH .....                                                                                                                                                      | 4-10          |
| Physics 10 or 7A-7B .....                                                                                                                                                                   | 4-8           |
| Biological Sciences 1A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology and Behavior 10 ..... | 5-8           |
| One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units .....                                                                                 | 4-5           |
| <b>Depth Subject Matter</b> .....                                                                                                                                                           | <b>48</b>     |
| Five Psychology courses, distributed as specified:                                                                                                                                          |               |
| Group A: two courses from 100, 130, 131, 132, 133, 135 .....                                                                                                                                | 8             |
| Group B: two courses from 101, 108, 113, 129, 134, 150, 152, 160 .....                                                                                                                      | 7-10          |
| Group C: one course from 112 (or Human Development 100A or 100B), 143, 145, 147, 168 .....                                                                                                  | 4             |
| Additional units to achieve a total of 40 upper division units in psychology .....                                                                                                          | 9-12          |
| (A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)                                                           |               |
| Psychology 103 .....                                                                                                                                                                        | 5             |
| One course from Psychology 104, 105, or the equivalent .....                                                                                                                                | 4             |
| One course sequence from Statistics 106-108, 130A-130B, 131A-131B .....                                                                                                                     | 8             |
| <b>Total Units for the Major</b><br>(Mathematics Emphasis) .....                                                                                                                            | <b>92-106</b> |

### 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 103 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.** L.P. Acredolo, J.P. Capitanio, L.M. Chalupa, R.G. Coss, A.C. Elms, R.A. Emmons, K.P. Ericksen, G.S. Goodman, A.A. Harrison, K.R. Henry, J.T. Johnson, N.E.A. Kroll, L.A. Krubitzer, D.L. Long, G.R. Mangun, S.P. Mendoza, B.A. Olshausen, D.H. Owings, T.E. Parks, R.B. Post, R.W. Robins, P.R. Shaver, D.K. Simonton, R. Sommer, S. Sue, C. Tomlinson-Keasey, N.G. Waller, A.P. Yonelinas.

**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 112.



## Minor Program Requirements:

|                                                                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                          | UNITS     |
| <b>Psychology</b> .....                                                                                                                                  | <b>24</b> |
| Psychology 1 or the equivalent .....                                                                                                                     | 4         |
| One course from each of the following three groups .....                                                                                                 | 11-13     |
| Group A: Psychology 100, 130, 131, 132, 133, 135                                                                                                         |           |
| Group B: Psychology 101, 108, 113, 129, 134, 150, 152, 160                                                                                               |           |
| Group C: Psychology 112, 143, 145, 147, 168                                                                                                              |           |
| Additional units to achieve a total of 20 upper division units .....                                                                                     | 7-9       |
| 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 Room Directory*.

## Courses in Psychology (PSC)

### Lower Division Courses

**1. General Psychology** (4) I, II, III. The Staff  
Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only 2 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.

**\*20. Freshman Psychology Seminar** (4)  
The Staff  
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) I, II, III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent; completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability and statistical inference.

**90X. Lower Division Seminar** (1-2) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**100. Introduction to Cognitive Psychology** (4) I, II, III. Kroll, Long, Mangun  
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.

**101. Introduction to Psychobiology** (4) I, II, III. Coss, Henry, Krubitzer, Owings  
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.

**103. Advanced Research Design and Data Analysis** (5) I, II. Kroll, Johnson, Waller  
Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

**104. Applied Psychometrics: An Introduction to Measurement Theory** (4) II. Waller  
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.

**105. Statistical Inference from Psychological Experiments** (4) II. Kroll  
Lecture—4 hours. Prerequisite: upper division standing in Psychology, courses 41 and 103. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics, with applications in sensory, perceptual, comparative, physiological, and other areas of psychology. Only 2 units of credit allowed to students who have taken Statistics 134.

**108. Physiological Psychology** (4) I, II, III. Chalupa, Henry, Krubitzer, Mendoza  
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101. Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. An introduction to the methodology of physiological psychology and neuroscience.

**112. Developmental Psychology** (4) I, II, III. Acredolo, Goodman, Tomlinson-Keasey  
Lecture—4 hours. Prerequisite: courses 1, 41. An 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 taken Human Development 100A or 100B.

**\*113. Developmental Psychobiology** (4)  
Mendoza  
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.

**114. Gender and Social Development** (4) II. The Staff  
Lecture—4 hours. Prerequisite: courses 1, 41. Biological and social factors that influence when and how psychological sex-related differences will be expressed in human development. Special attention to the scientific and social rationales which underlie the study of gender. GE credit: SocSci, Div, Wrt.

**115. Psychology and Law** (4) II. Goodman, Johnson  
Lecture—4 hours. Prerequisite: courses 1 and 41. 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. Offered in alternate years.

**120. History of Psychology** (4) II. Simonton  
Lecture—3 hours; term paper. Prerequisite: courses 1, 41; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science. GE credit: SocSci, Wrt.

**124. Comparative Neuroanatomy** (4) II. Krubitzer, Recanzone  
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.)

**129. Sensory Processes** (5) I, III. Henry, Krubitzer, Mendoza, Mangun, Olshausen  
Lecture—4 hours; term paper. Prerequisite: course 101. Psychobiology of sensory systems in man and other animals. The relationship of behavior to the physiology, structure, and function of the senses. GE credit: Wrt.

**130. Human Learning and Memory** (4) I, II, III. Parks, Goodman, Yonelinas  
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.

**131. Perception** (4) I, II, III. Olshausen, Parks, Post  
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.

**132. Language and Cognition** (4) II, III. Long  
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.

**133. The Development of Memory** (4) III. Goodman  
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, and 100; course 112 strongly recommended. Theory and research on memory development with focus on infancy and childhood.

**134. Animal Cognition** (4) II. Coss  
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 101. An 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.

**135. Cognitive Neuroscience: The Biological Foundations of the Mind** (4) III. Mangun  
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, and 100; or consent of instructor; courses 108, 129, or 131 highly 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 relationships of mind to brain.

**143. Human Emotion and Feeling** (4) III. Shaver  
Lecture—4 hours. Prerequisite: introductory psychology course, and course 41. An introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge.

**144. Environmental Awareness** (4) I, II. Sommer, Coss  
Lecture—4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology. GE credit: SocSci.

- 145. Social Psychology** (4) I, II, III. Simonton, Johnson, Robins, Shaver  
Lecture—4 hours. Prerequisite: courses 1, 41. 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.
- 147. Personality Theory** (4) I, II, III. Elms, Emmons, Erickson, Robins  
Lecture—4 hours. Prerequisite: courses 1, 41. The theories of Freud, Erikson, and other major twentieth-century approaches to personality. GE credit: SocSci, Wrt.
- 149. Gender and Human Reproduction** (4) I. Erickson  
Lecture—4 hours. Prerequisite: courses 1, 41. The social psychology of human reproduction. Examines gender relations over the course of the individual's reproductive cycle.
- 150. Advanced Animal Behavior** (4) II. Owings, Clayton  
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 102. 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.)
- 152. Hormones and Behavior** (3) III. Mendoza  
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101 and either course 101 or Neurobiology, Physiology and Behavior 102. 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).
- 160. Health Psychology** (4) II, III. Capitanio, Emmons  
Lecture—3 hours; term paper. Prerequisite: course 101. 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. Application of principles in written exercises.
- 163. Mathematical Models in Neuroscience and Psychology** (4) II. Olshausen, Sutter  
Lecture—3 hours; term paper. Prerequisite: Mathematics 16B, Physics 7B; course 101 or Neurobiology, Physiology and Behavior 100. Basic mathematical modeling techniques used in neuroscience and psychology. Specific topics include linear systems theory, Fourier transforms, neural networks, adaptive systems, probabilistic inference and information theory. Emphasis on understanding information processing in neural systems (Same course as Neurobiology, Physiology and Behavior 163.)
- 165. Introduction to Clinical Psychology** (4) I, II, III. The Staff  
Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 112 or 145. 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.
- 168. Abnormal Psychology** (4) I, II, III. Emmons, Sommer, Waller  
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.

- 170. Psychology of Religious Experience** (4) III. Emmons  
Lecture—4 hours. Prerequisite: courses 1 and 41. An overview of the major theories, issues, data, and research methodologies of the psychology of religion. Topics covered include 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.
- 175. Genius, Creativity, and Leadership** (4) I. Simonton  
Lecture—4 hours. Prerequisite: course 1 or 16; course 41. The phenomenon of genius is 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.
- 177. Psychobiography and Life History** (4) I. Elms  
Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor; course 41. Case-history research as a nonquantitative approach to studying personality. Psychological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. GE credit: SocSci, Wrt.
- 180A. Research in Cognitive and Perceptual Psychology** (4) II, III. The Staff  
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 once for credit when content differs.
- 180B. Research in Psychobiology** (4) III. The Staff  
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 once for credit when content differs.
- 180C. Research in Personality and Social Psychology** (4) II. The Staff  
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 once for credit when specific content differs.
- 181. Interactive Computer Programming for Psychological Experiments** (4) II. Kroll  
Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor, course 41 and one of courses 130, 132, or 136. Instruction in programming with an emphasis on programming desk-top computers as an interactive research tool.
- 183. Organizational Psychology** (4) III. Harrison  
Lecture—4 hours. Prerequisite: introductory psychology course; course 41. Survey of interrelationships among psychological processes, interpersonal dynamics, and organizational forms. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, career development, organizational development, and organization-community relations.
- 190. Seminar in Psychology** (4) The Staff  
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.

- 190X. Upper Division Seminar** (1-2) I, II, III. The Staff  
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) I, II, III. Harrison, Sommer  
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 once for credit. Limited enrollment (P/NP grading only.)
- 194HA-194HB. Special Study for Honors Students** (3-3) I-II, II-III. The Staff  
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) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)
- 199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)
- Graduate Courses**
- 200. Proseminar in Psychology** (3) I. The Staff  
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.)
- 201. Research Preceptorship** (4) I, II, III. The Staff  
Laboratory—3-4 hours; discussion—3-5 hours. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)
- 202. Research Seminar** (1) I, II, III. The Staff  
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.)
- 204. Advanced Applied Psychometrics: An Introduction to Measurement Theory** (4) II. Waller  
Lecture—4 hours. Prerequisite: course 41, 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.
- 205. Advanced Statistical Inference from Psychological Experiments** (5) II. Kroll  
Lecture—5 hours; project and term paper. Prerequisite: graduate student standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

**\*206. Statistical Analysis of Psychological Experiments (4)**

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and tests of trends.

**207A. Causal Modeling of Correlational Data (4) II. Simonton**

Lecture—4 hours. Prerequisite: course 205, 206 or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques.

**207B. Applied Multivariate Analysis of Psychological Data (4) III. Waller**

Lecture—4 hours. Prerequisite: course 205, 207A or consent of instructor. Review of the major methods of multivariate data analysis for psychological data. Students will program statistical routines using a linear algebra-based computing language. Contemporary methods, such as LISREL, will also be covered.

**208. Physiological Psychology (4) II. Chalupa, Henry, Mendoza**

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.

**212. Developmental Psychology (4) III. Acredolo, Shields, Goodman**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

**\*220. History of Psychology (4) The Staff**  
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.

**230. Cognitive Psychology (4) I. Kroll, Long, Goodman, Mangun, Parks**

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.

**231. Sensation and Perception (4) II. Post**  
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.

**245. Social Psychology (4) I. Robins**  
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

**247. Personality (4) III. Emmons, Ericksen, Robins**  
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

**250. Comparative Psychology (4) I. The Staff**  
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

**\*251. Topics in Genetic Correlates of Behavior (4). Waller**  
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) Chalupa, Owings, Mendoza**

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.

**261. Cognitive Neuroscience (4) III. Mangun**  
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.)

**263. Topics in Cognitive Psychology (4) II. Acredolo, Goodman, Kroll, Long, Parks, Post, Yonelinas**

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.

**264. Topics in Psycholinguistics (4) III. Long**  
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) The Staff**  
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 Psychology (4) Elms, Emmons, Ericksen, Shaver**  
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Critical study of a selected area of personality psychology. May be repeated for credit when content differs.

**290. Seminar (4) I, II, III. The Staff**  
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.

**291. Current Research in Psychology (2) I, II, III. The Staff (Chairperson in charge)**  
Seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. Topics relevant to current research in psychology will be discussed and methods employed in contemporary research will be evaluated. Students present a seminar on their own research. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff**  
(S/U grading only.)

**299. Research (2-9) I, II, III. The Staff**  
(S/U grading only.)

**299D. Dissertation Research (1-12) I, II, III. The Staff**  
Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course**

**390A-390B. The Teaching of Psychology (6-4) II-III. The Staff**  
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.)

**396. Teaching Assistant Training Practicum (1-4) I, II, III. The Staff (Chairperson in charge)**  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Radiation Oncology

See Medicine, School of

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## Radiology

See Medicine, School of

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## Range and Wildlands Science

See Agronomy and Range Science; Range and Wildlands Science; and Range Science

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## Range and Wildlands Science

(College of Agricultural and Environmental Sciences)  
*Admission into the Range and Wildlands Science major has been discontinued. Students interested in this area should refer to the Agricultural Systems and Environment major, Range and Natural Resources specialization.*

### The Major Program

Range and wildlands science is the study of the biological and physical components of land resources which are used mostly for grazing domestic livestock, but which also provide wildlife habitats, watersheds, recreation, and open space.

**The Program.** The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

**Career Alternatives.** Range and wildlands science graduates, especially those with some experience, may be employed as consultants, extension specialists, ranch managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that trainee or apprenticeship experience with that agency be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for natural resource management positions.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

English Composition Requirement.....0-8

See College requirement

Preparatory Subject Matter .....63-67

Animal science (Animal Science 2) .....4



Biological sciences (Biological Sciences 1A, 1B, 1C) .....15  
 Chemistry (Chemistry 2A, 2B, 8A, 8B) .....16  
 Computer science (Agricultural Science and Management 21, Engineering 5, or Computer Science Engineering 10) .....3  
 Economic principles (Agricultural and Resource Economics 1, Economics 1A, or 1B) .....4-5  
 Geology (Geology 1-1L) .....4  
 Mathematics (Mathematics 16A; 16B recommended) .....3-6  
 Physics (Physics 1A, 1B) .....6  
 Soil science (Soil Science 100) .....4  
 Statistics (Agricultural Science and Management 150) .....4

**Breadth/General Education .....6-24**  
 Satisfaction of General Education requirement to include two non-introductory courses in Agricultural and Resource Economics, Economics, Environmental Science and Policy, or Geography.

**Depth Subject Matter .....51-56**  
 Plant physiology (Botany 111 or Water Science 104) .....3-4  
 Plant ecology (Botany 117 or Plant Science 101) .....4  
 Meteorology (Geography 3, Atmospheric Science 105) .....3-4  
 Soil science, two upper division courses .....6-8  
 Watershed management (Water Science 141) .....3  
 Animal nutrition (Nutrition 115) .....4  
 Wildlife ecology or management, one upper division course in wildlife, fish and conservation biology, or zoology .....3-4  
 Forage crops (Agronomy 112) .....3  
 Select units from Range Science: .....18  
 Range and wildland plants (Range Science 100)  
 Range ecology (Range Science 133, 134, 135)  
 Range field course (Range Science 105)  
 Range livestock production (Range Science 160)  
 Revegetation of disturbed lands (Range Science 145)  
 Range Science 192, 198, 199 (not more than a total of 3 units can be counted)  
 Aerial photo interpretation and remote sensing (Geography 106) .....4

**Restricted Electives .....6-8**  
 Two upper division natural science or applied biological science courses in one or two of the following: animal science, botany, entomology, genetics, geography, mathematics, nematology, plant pathology, plant science, environmental and resource sciences, water science, or weed science.

**Unrestricted Electives .....17-47**  
**Total Units for the Major .....180**

**Major Adviser.** Contact department office.

**Advising Center** for the major is in 152 Hunt Hall.

**Graduate Study.** See the Ecology Graduate Group.

## Range Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of Agronomy and Range Science.

**Related Courses.** See Agricultural Systems and Environment 101, 112, 130, 131, 134, 135, 137, Nutrition 115, Soil Science 105, 120, Wildlife, Fish and Conservation Biology 151.

## Courses in Range Science (RMT)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 152 Hunt Hall.

### Lower Division Course

**92. Range Science Internship (1-12) I, II, III, summer.** The Staff (Department Chairperson in charge)  
 Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

### Upper Division Courses

**192. Range Science Internship (1-12) I, II, III, summer.** The Staff (Department Chairperson in charge)  
 Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Department Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Department Chairperson in charge)  
 Prerequisite: senior standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)  
 (S/U grading only.)

## Religious Studies

(College of Letters and Science)

———, Ph.D., Program Director

Program Office, 522 Sproul Hall (530-752-9932)

World Wide Web: <http://religions.ucdavis.edu>

### Committee in Charge

Emily Albu, Ph.D. (*Classics*)

Lincoln D. Hurst, Ph.D. (*Religious Studies*)

Naomi Janowitz, Ph.D. (*Religious Studies*)

Whalen Lai, Ph.D. (*Religious Studies*)

Jay Mechling, Ph.D. (*American Studies*)

Jacob Olupona, Ph.D. (*African American and African Studies*)

Peter Schaeffer, Ph.D. (*German*)

### Faculty

Lincoln D. Hurst, Ph.D., Associate Professor

Naomi Janowitz, Ph.D., Associate Professor

Whalen W. Lai, Ph.D., Professor

### Affiliated Faculty

Linda Hess, Ph.D., Lecturer

Bruce Rosenstock, Ph.D., Lecturer

### The Major Program

Majoring in religious studies provides an opportunity to explore and analyze the great written and oral traditions of the world's religions: Hinduism, Buddhism, Judaism, Christianity, Islam, contemporary groups in the U.S., and African religions.

**The Program.** The major introduces students to the academic study of religion. The religious studies major offers a broad choice of courses, including history, philosophy, sociology, anthropology, American studies, classics, and medieval studies. For some stu-

dents, religious studies is an appropriate second major and might combine well with anything from philosophy to international agricultural development, from history to international relations. The religious studies program has also designed four options for minor programs: religious studies, Asian religions, Judaism, and Christian studies.

**Career Alternatives.** The emphasis in religious studies courses on developing analytical thinking skills and clear written expression is an asset for many career goals. As a strong liberal arts program, the major can lead to research and/or teaching on all levels, as well as careers in related areas such as the ministry, counseling, social work, and other helping professions. Because the major integrates so many academic areas, it is also an excellent background for graduate programs, especially in the humanities, and for professional schools including law, business, and foreign service.

### A.B. Major Requirements:

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#### Preparatory Subject Matter .....24

At least one course from each of the following groups .....20

(a) Religious Studies 1, 2

(b) Religious Studies 21, 23, 40, 60, 70, 75

Anthropology 2 or, with approval from adviser, a lower division course related to religion from African American and African Studies, American Studies, Philosophy, Native American Studies, or other departments .....4

#### Depth Subject Matter .....40

Five upper division Religious Studies courses plus Religious Studies 100 .....24

Two upper division History courses related to religion .....8

Sociology, philosophy, anthropology .....8

Two upper division courses related to religion in the above disciplines such as Philosophy 105, 145, Sociology 146, 149, Anthropology 124; or, with approval from adviser, in other disciplines such as Medieval Studies, Native American Studies, African American and African Studies, Classics, or other departments.

#### Total Units for the Major .....64

**Recommended.** A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.

**Course Equivalents.** The major advisers have a list of lower and upper division courses that can be substituted for courses suggested above.

**Major Advisers.** W.W. Lai, N. Janowitz, L. Hurst.

### Minor Program Requirements:

The following four minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee. The four areas of emphasis are Religious Studies, Asian Religions, Judaism, and Christian Studies.

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.

**Premierial Adviser.** L.D. Hurst.

**Jewish Studies.** Students interested in Jewish studies should contact N. Janowitz of Religious Studies or H. Murav of Comparative Literature.

**Courses in Hebrew (HEB)****Lower Division Courses**

**1. Elementary Hebrew** (5) I. The Staff  
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.)

**2. Elementary Hebrew** (5) II. The Staff  
Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 1 or the equivalent. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew.

**3. Elementary Hebrew** (5) III. The Staff  
Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 2 or the equivalent. Speaking, listening comprehension, reading and writing fundamentals of modern Hebrew.

**Upper Division Courses**

**100. Introduction to Modern Literary Hebrew** (4) I. Rosenstock  
Lecture/discussion—4 hours. Prerequisite: course 3 or the equivalent. Advanced topics in Hebrew grammar and syntax, selected literary texts, and advanced work in modern spoken Hebrew.

**101. Biblical Hebrew Literature** (4) II. Rosenstock  
Lecture/discussion—4 hours. Prerequisite: course 100 or the equivalent. The major literary genres of the Hebrew Bible: narrative Psalms, wisdom, prophecy, and love poetry. Study of biblical Hebrew grammar. Modern Hebrew used in oral presentations and class discussion. GE credit: ArtHum, Wrt.

**102. Post-Biblical Hebrew Literature** (4) III. Rosenstock  
Lecture/discussion—4 hours. Prerequisite: course 3. Rabbinic and medieval Hebrew literature, modern Hebrew prose and poetry. Oral presentations and class discussion in modern Hebrew. GE credit: ArtHum, Wrt.

**Courses in Religious Studies (RST)****Lower Division Courses**

**1. Survey of Religion** (4) II. Lai and staff  
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.

**2. Myth, Ritual, and Symbolism** (4) I, III. Lai, Janowitz  
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. GE credit: ArtHum, Div, Wrt.

**3A-C. Topics in Comparative Religion** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour. Introduction to the methods used in comparative religion, focusing on a particular theme in a number of religious traditions: **(A)** The Experiential Dimension: Pilgrimage; **(B)** The Mythic Dimension: Death and the After-life; **(C)** The Ritual Dimension: Sacrifice. May be repeated for credit in a different subject area. GE credit: ArtHum, Div, Wrt.

**\*4. Eastern Religions** (4) I. Lai  
Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, and Taoism from their origins to the present.

**\*10. Introduction to Religious Studies** (2) II. Lai  
Lecture—2 hours. Topic of importance in more than one religious tradition as an illustration of the problems and methods of religious studies. May be repeated for credit in a different subject area.

**21. Hebrew Scriptures** (4) I. Janowitz  
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.

**23. Introduction to Judaism** (4) II. Janowitz  
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.

**40. New Testament** (4) I. Hurst  
Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical, and theological perspectives. GE credit: ArtHum, Wrt.

**60. Introduction to Islam** (4) III. The Staff  
Lecture/discussion—4 hours. Introduction to topics at core of Islamic tradition including Muhammad, the Qur'an, Islamic law, Sufism and sects as well as to selected topics including Islamic revival.

**\*75. Chinese Philosophy: An Introduction** (3) I. Lai  
Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from classical to modern times: emphasis on basic metaphysics and its change over time, including Confucian humanism, Taoist cosmology, the Han synthesis of Tao, Yin-yang and Five Elements; its impact on Buddhism, Sung new synthesis and conflict with the West. Offered in alternate years.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

**99. Special Study for Lower Division Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

**Upper Division Courses**

**100. Study of Religion: Issues and Methods** (4) III. Olupona  
Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

**102. Christian Origins** (4) I. Hurst  
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.

**\*110. Life, Meaning and Identity** (4) II. Lai  
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.

**115. Mysticism** (4) III. The Staff  
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 3-4 years. GE credit: ArtHum, Div, Wrt.

**\*122. Studies in Biblical Texts** (4) III. Janowitz  
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 once for credit in different subject area.

**124. Topics in Judaism** (4) II. Janowitz  
Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. May be repeated once for credit in different subject area.

**125. Dead Sea Scrolls, Apocrypha, and Pseudepigrapha** (4) III. Rosenstock  
Lecture/discussion—4 hours. Prerequisite: courses 21 or 40. Survey of the major apocryphal and pseudepigraphical writings of the ancient Near East and their historical, social, and religious importance. GE credit: Wrt.

**130. Topics in Religious Studies** (4) II, III. The Staff (Chairperson in charge)  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 2 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; review of theory and method included. May be repeated twice for credit in different subject area.

**140. Christian Theology** (4) I. Hurst  
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.

**141A. New Testament Literature: Synoptic Gospels** (4) II. Hurst  
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) III. Hurst  
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.

**\*141C. New Testament Literature: Paul** (4) II. Hurst  
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.

**142. Tyndale and the Beginnings of the English Bible** (4) I. Schaeffer  
Lecture/discussion—3 hours; term paper. Prerequisite: course 40 recommended. Study of Tyndale's *New Testament* translation as a literary and cultural monument in the context of previous Biblical translation, the historical situation in the 16th century, and the influence of this version on the English language and its literature. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*145. Contemporary American Religion** (4) II. Hurst  
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.

**\*150. Religious Ethics** (4) II. Lai  
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.

**\*168. Hinduism** (4) I. The Staff  
Lecture—3 hours; term paper. Prerequisite: course 4. 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.

**170. Buddhism** (4) III. Lai  
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 4. Study of 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.

**\*172. Ch'an (Zen) Buddhism** (4) II. Lai  
Lecture/discussion—3 hours; term paper. Prerequisite: course 4 recommended. Doctrines and methods of the Patriarchs and great masters, both ancient and modern, in the framework of the orthodox Buddhist tradition. Doctrinal basis of meditational techniques.

**178A-E. Undergraduate Proseminar in Religion and Culture** (2) II. The Staff

Lecture/discussion—2 hours. Prerequisite: upper division standing and one course in religious studies or consent of instructor. Individual topics are discussed by lecturers from this campus and elsewhere. Each student writes a term paper in one of these areas. Content alternates among the following: **\*(A)** Idioms of Religion; **\*(B)** Cultural and Social Context of Religion; **\*(C)** Religion and Mind; **\*(D)** Religion and Visual Arts; **\*(E)** Religion, Music, and Drama. (P/NP grading only.)

**189. Senior Colloquium** (4) II. The Staff  
(Chairperson in charge)

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.

**190. Seminar** (4) I. The Staff

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. Offered in alternate years.

**194HA-194HB. Special Study for Honors Students**

(1-5) I, II, III. The Staff (Director in charge)  
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) I, II, III.  
The Staff (Chairperson in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff  
(Chairperson in charge)

(P/NP grading only.)

## Russian

(College of Letters and Science)

Daniel Rancour-Laferriere, Ph.D., Program Director  
Program Office, 616 Sproul Hall (530-752-4999)  
World Wide Web: <http://russian.ucdavis.edu>

**Committee in Charge**

Yuri Druzhnikov, Ph.D. (*Russian*)  
Harriet Murav, Ph.D. (*Russian*)  
Daniel Rancour-Laferriere, Ph.D. (*Russian*)

**Faculty**

Frederick Choate, Ph.D., Lecturer  
Yuri Druzhnikov, Ph.D., Professor  
Harriet Murav, Ph.D. Associate Professor  
Daniel Rancour-Laferriere, Ph.D., Professor  
Olga Stuchebrukhov, M.A., Lecturer

**Emeriti Faculty**

James Gallant, Ph.D. Lecturer Emeritus  
Valerie A. Tumins, Ph.D., Professor Emerita

### The Major Program

The Russian major introduces students to a culture rich in art, language, and literature and presents an important skill needed to enter the fields of foreign affairs, world politics, and international trade, or to begin graduate work in literature, history, and international relations.

**The Program.** The department offers a choice of three emphases. The common basis for the first two is extensive training in the Russian language. The *Russian Literature* emphasis concentrates on the evaluation of Russian literary movements and cultural trends. The second area of study, the *Russian Language* emphasis, focuses on linguistics and practical language skills. The third area, the *Russian Area Studies* emphasis, provides an interdisciplinary program offering training in the Russian language and literature and in the historical development and contemporary social, political, and economic conditions of the former Soviet Union.

**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 department encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, or economics in order to maximize their career possibilities.

### A.B. Major Requirements:

UNITS  
**Preparatory Subject Matter** .....0-38

**Literature/Language** emphasis  
Russian 1 through 6 (or the equivalent) ...0-30  
Russian 41, 42 .....8  
Recommended, Linguistics 1.

**Area Studies** emphasis  
Russian 1 through 6 or the equivalent ...0-30  
Russian 41 or 42 or the equivalent course in basic literary analysis .....4

**Depth Subject Matter** .....36-44

**Russian Literature** emphasis  
Russian 101A, 101B, 101C .....12  
Russian 102 or 103 or 105 .....4  
Russian 121, 123 .....8  
Russian 127 or 128 .....4  
Additional upper division units chosen in consultation with adviser .....8

**Russian Language** emphasis  
Russian 101A, 101B, 101C .....12  
Russian 102 or 105 .....4  
Russian 103 or 104 .....4  
Russian 160 .....4  
Additional upper division units chosen in consultation with adviser .....12

**Russian Area Studies** emphasis  
Russian 105 .....4  
Russian 101A, 103, or 104 .....4  
Russian 150 .....4  
Three literature courses to be chosen from Russian 121, 123, 126, 128, 140, 141...12  
History 137B, 137C .....8  
Three courses, with no more than two in one area, to be chosen from the following two areas: (a) History 137A, 138, 102F; (b) Social sciences—Political Science 136, Economics 117, Geography 124 .....12  
(To meet special interest course needs, a student should obtain written approval from an adviser.)

**Total Units for the Major** .....44-78

**Major Adviser.** J. Gallant.

### Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

UNITS  
**Russian** .....20  
**Russian Language** emphasis .....20  
Russian 6 .....4  
Russian 101A, 101B, 101C .....12  
One course from Russian 102, 103, 104, 105, 160 .....4  
**Russian Literature** emphasis .....20  
Russian 41 or 42 .....4  
Russian 121, 123; and 140 or 141 .....12  
One course from Russian 120, 126, 150, 154 .....4  
**Russian Area Studies** emphasis .....20  
Three courses to be chosen from Russian 121, 123, 126, 150, 154 (Russian 41 or 42 or the equivalent course in basic literary analysis required) .....12  
One course from History 137B, 137C .....4  
One course from Political Science 136, Economics 117, Geography 124 .....4

**Honors and Honors Program.** The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

**Study Abroad.** Students who have completed two years of Russian language study can participate in the Education Abroad Program in Moscow. Many of our students also participate in summer, semester, and year programs sponsored by CIEE and ACTR in St. Petersburg and Moscow.

**Teaching Credential Subject Representative.** J. Gallant. See also under Teacher Education Program.

**Graduate Study.** The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser. *Admission into the graduate program in Russian is closed for the 1998-99 academic year.*

**Graduate Adviser.** D. Rancour-Laferriere.

**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) I. The Staff  
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.)

**2. Elementary Russian** (5) II. The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

**3. Elementary Russian** (5) III. The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.



**4. Intermediate Russian (4) I.** The Staff Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.

**5. Intermediate Russian (4) II.** The Staff Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature. Conversational practice.

**6. Intermediate Russian (4) III.** The Staff Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.

**10. Elementary Conversation (2) II, III.** The Staff Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and master spoken idioms. May be repeated for credit up to a maximum of 6 units.

**41. Survey of Nineteenth-Century Russian Literature (in English) (4) I.** Murav

Lecture—3 hours. Introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*42. Survey of Twentieth-Century Russian Literature (in English) (4) II.** Rancour-Laferriere Lecture—3 hours. Introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz. Offered in alternate years. GE credit: ArtHum, Wrt.

**44. Children's Literature in Russia (4) I.** Druzhnikov

Lecture—3 hours; term paper. Knowledge of Russian not required. History and theory of children's literature, with special reference to Russian and Soviet examples. Analysis of genres, technique, and folklore elements, contrasted with those of the West. Students will write their own literature for children. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**98. Directed Group Study (1-5) I, II, III.** The Staff Discussion—1-5 hours. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge) (P/NP grading only.)

**Upper Division Courses**

**101A. Advanced Russian (4) I.** Gallant Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 6. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**101B. Advanced Russian (4) II.** Gallant Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**101C. Advanced Russian (4) III.** Gallant Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101B. Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**\*102. Russian Composition (4) II.** Gallant Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 6. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet and American lifestyles; current events. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

**\*103. Literary Translation (4) III.** Murav Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically

equivalent idiomatic English. Offered in alternate years.

**\*104. Scientific Translation (4) III.** Rancour-Laferriere Discussion—3 hours; individual translation projects—1 hour. Prerequisite: course 101A. Techniques of translating Russian scientific texts. Science students will select articles from their fields of interest; Russian students will work on materials assigned by instructor. Offered in alternate years.

**\*105. Advanced Russian Conversation (4) III.** Druzhnikov Conversation—3 hours; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in alternate years.

**\*121. Nineteenth-Century Russian Prose (in English) (4) I.** Druzhnikov

Lecture—3 hours; term paper. 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. Offered in alternate years. GE credit: ArtHum.

**\*123. Twentieth-Century Russian Prose (in English) (4) II.** The Staff

Lecture—3 hours; term paper. Examination of various trends including Acmeism, Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such writers as Gorky, Zamiatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in alternate years. GE credit: ArtHum, Wrt.

**126. The Russian Theater (in English) (4) II.** Murav

Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Turgenev, Tolstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in alternate years. GE credit: ArtHum, Wrt.

**127. Nineteenth-Century Russian Poetry (4) II.** Rancour-Laferriere

Discussion—3 hours; term paper. Prerequisite: course 6. 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.

**\*128. Twentieth-Century Russian Poetry (4) II.** Druzhnikov

Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Mandelstam, Esenin, Mayakovsky, Khlebnikov, Pasternak, Evtushenko, Voznesensky, and Brodsky. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

**129. Russian Film (4) III.** Murav Lecture/discussion—3 hours; term paper; 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. In English; films with English subtitles. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**\*130. Contemporary Soviet Culture (4) III.** Murav

Lecture—3 hours; written work. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between artists and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*131. Literature of Revolution (4) II.** Murav Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of impact of revolution on society and culture; the major artistic, political and historical works surround-

ing the Russian revolutions of 1905 and 1917. Offered in alternate years. GE credit: ArtHum, Wrt.

**\*132. Nature and Culture in the Soviet Union (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in environmental studies. Presents a history of the Soviet environmental movement from the 1920s to the present, showing the influence of Stalinism on environmental ethics; concepts of society and nature in Soviet literature and film; and international implications of Soviet environmental policy. No knowledge of Russian required. GE credit: ArtHum, Wrt.

**139. Pushkin (in English) (4) I.** Druzhnikov Lecture/discussion—3 hours; term paper. The life and works of Pushkin, the most prominent poet of Russia. Evaluations of Pushkin by both Russian and Western scholars. Images of Pushkin and the official myths that surround him. No knowledge of Russian required. GE credit: ArtHum, Div, Wrt.

**\*140. Dostoevsky (in English) (4) III.** Murav 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.

**141. Tolstoy (in English) (4) I.** Rancour-Laferriere 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.

**\*142. Women's Autobiography (in English) (4) I.** Murav

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.

**\*143. Alexander Solzhenitsyn (4) II.** Rancour-Laferriere

Lecture/discussion—3 hours; term paper. Prerequisite: any introductory literature course or consent of instructor. Examination of the literary and political writings of the major Russian dissident in the biographical context in which they were created. Knowledge of Russian not required. GE credit: ArtHum, Div, Wrt.

**150. Russian Culture (4) III.** The Staff 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.

**\*151. Soviet Writers and Censorship (4) II.** Druzhnikov

Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Preparation List or consent of instructor. Literature and censorship in the Soviet Union. Personal responsibility of the author vs. conformism to state morality. Soviet myths and Soviet realities. GE credit: ArtHum, Wrt.

**\*154. Russian Folklore (4) III.** Rancour-Laferriere Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peoples. Sociological implications of attitudes toward family unit, children, etc. Influences of folklore on Russian literature and historiography. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**\*159. Yiddish Literature in Translation (4) III.** Murav

Lecture/discussion—4 hours. Introduction to the major writers of Yiddish in English translation. Readings will sample the major genres of Yiddish literature from the mid-19th century to the present. Offered in alternate years. GE credit: ArtHum, Div.

**\*160. Russian Phonology and Morphology** (4) II. Gallant

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word-formation. Offered in alternate years.

**\*166. Representations of Sexuality in Russian Literature** (4) I. Rancour-Laferriere

Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual, feminist-psychoanalytic perspective. Monogamy, free love, sexism, homosexuality, incest, androgyny, and others as depicted by such writers as Pushkin, Gogol, Tolstoy, Dostoevsky, Akhmatova, Blok, Tolstaiia, and others. GE credit: ArtHum, Div, Wrt.

**192. Research Essay** (2) I, II, III. The Staff

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) I, II, III. The Staff

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) I, II, III. The Staff

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) I, II, III.

The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff

(Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses****\*200. Old Church Slavic** (4) I. Gallant

Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic. Offered in alternate years.

**\*202. History of the Russian Language** (4) II.

Gallant

Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of Russian literary language. Reading in the original texts from eleventh to eighteenth century. Offered in alternate years.

**\*204. Descriptive Russian Grammar** (4) III.

Gallant

Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in alternate years.

**\*210A. Style and Syntax** (4) I. Druzhnikov

Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

**\*210B. Style and Syntax** (4) II. Druzhnikov

Discussion—3 hours; reading projects—1 hour. Prerequisite: course 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

**\*210C. Russian Style and Syntax** (4) III.

Druzhnikov

Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talks on political, economical, social, and cultural topics, lead and participate in discussions. Conducted in Russian.

**\*220. Old Russian Literature** (4) II. The Staff

Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as *The Song of Igor's Campaign*, *Zadonshchina*, Epifany's *Lives*, Ivan IV's cycle of epistles. May be repeated for credit when topic differs. Offered in alternate years.

**\*221. Eighteenth-Century Russian Literature**

(4) II. The Staff

Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit topic differs. Offered in alternate years.

**\*222. Nineteenth-Century Russian Literature**

(4) I. Rancour-Laferriere, Murav

Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when topic differs. Offered in alternate years.

**\*223. Early Twentieth-Century Russian Literature**

(4) I. Rancour-Laferriere

Seminar—3 hours. Advanced study of one or more of the modernist movements in Russian literature, including Symbolism, Acmeism, and Futurism. May be repeated for credit when topic differs. Offered in alternate years.

**\*224. Soviet Russian Literature** (4) III. Rancour-Laferriere, Druzhnikov

Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the development of genres, schools, styles, techniques, and various formal elements. May be repeated for credit when topic differs. Offered in alternate years.

**\*230. Pushkin Studies** (4) I. Druzhnikov

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: graduate standing or consent of instructor. The life and works of Pushkin; the history of Pushkin studies up to and including present-day controversies about Pushkin. Evaluations of Pushkin by both Russian and Western scholars. Images of Pushkin and the official myths that surround him. Conducted in Russian; readings in Russian and English.

**\*231. Humor and Satire** (4) III. Druzhnikov

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Origin and value of humor and satire in 18th-20th century Russian literature. Humor and satire as psychological phenomena and in literary theory. Classical writers as satirists. Link between satire and democratization of Russia. Conducted in Russian; readings in Russian and English. Offered in alternate years.

**\*250. Languages of Culture: Formalism, Semiotics, and Dialogue** (4) I. Murav

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Critical paradigms of formalism, semiotics, and "post-Structural" methods of M. Bakhtin, viewed in their historical and philosophical contexts. Extensions and critical evaluations of these paradigms in literary criticism, history, anthropology.

**\*260. Psychoanalysis and Literature** (4) I.

Rancour-Laferriere

Seminar—3 hours; term paper. Survey of psychoanalytic thinking from Freud, Jung, and Klein down to current object-relations theories. Application of psychoanalysis to literary works chosen by students participating in the seminar.

**\*298. Group Study** (1-5) I, II, III. The Staff

(Director in charge)

**\*299. Research** (1-12) I, II, III. The Staff (Director in charge)

(S/U grading only.)

**Professional Course****\*300. The Teaching of Russian** (2) I. The Staff

Discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Workshop in language teaching methods. Students audit classes in progress and teach under faculty supervision. Required of new and prospective teaching assistants. (S/U grading only.)

## Science and Society

(College of Agricultural and Environmental Sciences)

Susan B. Kaiser, Ph.D., Program Director

Ross B. MacDonald, Ph.D., Program Associate  
Director

Program Office, 143 Robbins Hall (530-752-8669)

**Committee in Charge**

Lynette A. Hart, Ph.D., Associate Professor (*School of Veterinary Medicine*)

Susan B. Kaiser, Ph.D., Professor (*Textiles and Clothing*)

Annie King, Ph.D., Associate Professor (*Avian Science*)

Ross B. MacDonald, Ph.D. (*Science and Society*)

David S. Reid, Ph.D., Professor (*Food Science and Technology*)

Howard G. Schutz, Ph.D., Professor Emeritus (*Food Science and Technology*)

John Stanfield, Ph.D., Professor (*African American and African Studies, Sociology*)

Ariena H.C. van Bruggen, Ph.D., Professor (*Plant Pathology*)

Steven A. Weinbaum, Ph.D., Professor (*Pomology*)

Linda S. Whent, Ph.D., Lecturer (*Agronomy and Range Science*)

Barry W. Wilson, Ph.D., Professor (*Avian Sciences, Environmental Toxicology*)

Eric E. Zilbert, Ph.D., Lecturer (*Agronomy and Range Science*)

**Faculty**

Lynn Epstein, Ph.D., Associate Professor (*Plant Pathology*)

Ian Garnett, Ph.D., Senior Lecturer (*Animal Science*)

Thomas R. Gordon, Ph.D., Associate Professor (*Plant Pathology*)

Jan W. Hopmans, Ph.D., Associate Professor (*Land, Air, and Water Resources*)

Bruce A. Jaffee, Ph.D., Professor (*Nematology*)

Adel A. Kader, Ph.D., Professor (*Pomology*)

Susan B. Kaiser, Ph.D., Professor (*Textiles and Clothing*)

Ross B. MacDonald, Ph.D. (*Science and Society*)

James D. Murray, Ph.D., Professor (*Animal Science*)

Dan E. Parfitt, Ph.D., Lecturer (*Pomology*)

Kathryn Radke, Ph.D., Associate Professor (*Avian Sciences*)

David S. Reid, Ph.D., Professor (*Food Science and Technology*)

David Rizzo, Ph.D., Assistant Professor (*Plant Pathology*)

Pamela C. Ronald, Ph.D., Assistant Professor (*Plant Pathology*)

Joe J. Stalustal, Ph.D., (*Land, Air, and Water Resources*)

Brett M. Tyler, Ph.D., Professor (*Plant Pathology*)

Ariena H.C. van Bruggen, Ph.D., Professor (*Plant Pathology*)

Steven A. Weinbaum, Ph.D., Professor (*Pomology*)

Linda S. Whent, Ph.D., Lecturer (*Agronomy and Range Science*)

Barry W. Wilson, Ph.D., Professor (*Avian Sciences, Environmental Toxicology*)

Eric E. Zilbert, Ph.D., Lecturer (*Agronomy and Range Science*)

**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, 90A,  
90B, 90C or 90X.....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 104, 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 Systems and Environment 122, Anthropology 120, Communication 115, 130, 135, 138, 140, or 145, Community and Regional Development 174, 175, Linguistics 163, Political Science 165.....3-4

#### *Culture, Ethics and Applications :*

Agricultural Systems and Environment 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, Science and Society 105, or Sociology 144 .....3-4

Capstone course, Science and Society 120 .....3

**Minor Adviser:** S.B. Kaiser.

**Related courses.** See Agricultural and Resource Economics 120, 147, 148, Agricultural Systems and Environment 1, 101, 122, Animal Science/International Agricultural Development 102, Communication 115, 140, Community and Regional Development 118, 142, 162, 174, 175, Avian Sciences 13, Environmental Science and Policy 115, 126, 160, 164, 165, Fiber and Polymer Science 110, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Philosophy 104, Plant Biology 12, 104, Plant Pathology 140, Political Science 156, 175, Wildlife, Fish and Conservation Biology 10.

## Courses in Science and Society (SAS)

### Lower Division Courses

#### 1. Preparing for the 21st Century (4) I. Kaiser, MacDonald

Lecture/discussion—3 hours; discussion—1 hour. Through an interactive panel format and discussion, contemporary issues and their role in the 21st century are creatively examined, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. GE credit: SciEng or SocSci, Div, Wrt.

#### 2. Feeding the Planet: Influences on the Global Food Supply (3) II. Reid

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.

#### \*3. Science, Technology and Society (4) III.

Kenney

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.

#### 5. Pathways to Discovery: Science and Society (3) I, II, III. The Staff (Kaiser in charge)

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 twice for credit. GE credit: SciEng or SocSci, Wrt.

#### 15. AIDS and Society (4) II. Radke

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.

#### 20. Genetics and Society (3) III. Ronald, Tyler

Lecture/discussion—3 hours; two field trips. Examination of basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process. Presentation, evaluation and critical discussions of the present and future impact of genetics on society. GE credit: SciEng or SocSci, Wrt.

#### 90A. Issues in Environmental and Resource Sciences (2) I, III. The Staff

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.

#### 90B. Observing and Writing in Biology (2) I.

Jaffee

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: Rejuvenation and

#### Relevance for the 21st Century (2) II. Weinbaum

Seminar—2 hours; one Saturday field trip. Discussion of the historical and current usage of medicinal plants in both traditional cultures and our own culture. Both supportive and negative as well as rational and irrational viewpoints will be covered. Field trip will teach herb identification.

#### 90X. Lower Division Seminar (1-4) I, II, III.

The Staff

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.

#### 92. Internship in Science and Society (1-12) I,

II, III. The Staff

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.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II,

III. The Staff (Director in charge)

Discussion—3-15 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

## Upper Division Courses

### 105. Organismal Interactions in Everyday Life

(3) II. van Bruggen

Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 10 or 1A. Ecology and evolution of organismal interactions and the importance of these interactions to human health and welfare and a sustainable environment. Students will debate environmental issues on scientific, political, and ethical grounds. GE credit: SciEng, Wrt.

### 120. Science and Contemporary Societal

Issues (3) I, II, III. The Staff

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 once for credit. GE credit: SciEng or SocSci, Wrt.

### 190X. Upper Division Seminar (1-4) I, II, III.

The Staff

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. May be repeated for credit. Limited enrollment.

### 192. Internship in Science and Society (1-12)

I, II, III. The Staff

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) I, II,

III. The Staff

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) I, II, III.

The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

### 199. Special Study in Science and Society (1-5)

I, II, III. The Staff (Director in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

## Graduate Courses

### 298. Group Study (1-5) I, II, III. The Staff (Kaiser

in charge)

Prerequisite: consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

### 299. Graduate Research (1-12) I, II, III. The Staff

(Kaiser in charge)

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) I, II, III. The Staff (Kaiser in charge)

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.)



## Science and Technology Studies

(College of Letters and Science)

Paul Teller, Ph.D., Program Director

Program Office, 106 Sproul Hall (530-752-9621)

### Committee in Charge

Joan Cadden, Ph.D. (*History*)

Michael R. Dietrich, Ph.D. (*History and Philosophy of Science*)

Deborah E. Harkness, Ph.D. (*History*)

Kevin D. Hoover, D. Phil. (*Economics*)

James R. Griesemer, Ph.D. (*Philosophy*)

Jay Mechling, Ph.D. (*American Studies*)

Benjamin S. Orlove, Ph.D. (*Environmental Science and Policy*)

Michael L. Smith, Ph.D. (*History*)

John H. Stanfield, Ph.D. (*African American and African Studies, Sociology*)

Paul Teller, Ph.D. (*Philosophy*)

### The Program of Study

The program in Science and Technology Studies offers courses and undergraduate programs of study exploring the nature of science, technology, and medicine in relation to their economic, social, political, and cultural environments. The curriculum is oriented toward 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 program will be of interest to undergraduate students who intend to pursue careers in which it will be useful to have a broad understanding of the nature and role of science, technology, and medicine; for example, careers in science teaching, medicine and other health care professions, technical writing and science journalism and science policy.

## Courses in Science and Technology Studies (STS)

### Lower Division Courses

#### 1. Introduction to Science and Technology Studies (4) II. Dietrich

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.

#### 20. Methods in Science and Technology Studies (4) III. Dietrich

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.

### Upper Division Course

#### 190. Seminar in Science and Technology Studies (4) III. Dietrich

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.

## 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's Studies.

### Minor Program Requirements:

UNITS

#### Social and Ethnic Relations .....24

Select one course from each of the following six groups to total 24 units. Courses applied toward the satisfaction of a major may not also be offered in satisfaction of the minor. No more than four units (one course) may be lower division.

- (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, 130A, 130B, 130C, 157, 180
- (f) Women's Studies 103, 104, 180

**Advising.** Contact Asian American Studies, 3102 Hart Hall, 530-752-3625.

## Social Theory and Comparative History

William W. Hagen, Ph.D., Program Director and Professor (*History*)

Program Office, 2231 Social Sciences and Humanities Building (530-752-8707)

**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 five participating departments (Anthropology, Economics, History, Political Science, 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 or History 204, 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 Office 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) I. The Staff

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 Comparative Research faculty and visitors discussing current research.

#### 290. Advanced Topics in Social Theory and Comparative History (4) I, II, III. The Staff

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.

#### 295. Advanced Group Research in Social Theory and Comparative History (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: consent of instructor. Participation in research workshops sponsored by the Center for Comparative Research in History, Society, and Culture. May be repeated for credit. (S/U grading only.)

## Sociology

(College of Letters and Science)

Lyn H. Lofland, Ph.D., Chairperson of the Department

Department Office, 1282 Social Sciences and Humanities Building (530-752-0782)

World Wide Web: <http://sociology.ucdavis.edu>

### Faculty

Nicole W. Biggart, Ph.D., Professor (*Sociology, Management*)

Fred Block, Ph.D., Professor

Lawrence E. Cohen, Ph.D., Professor

James C. Cramer, Ph.D., Associate Professor

Diane H. Felmler, Ph.D., Associate Professor

Luis Guarnizo, Ph.D., Assistant Professor (*Human and Community Development*)

Jack A. Goldstone, Ph.D., Professor

T. Ryken Grattet, Ph.D., Assistant Professor

John R. Hall, Ph.D., Professor

Frank Hirtz, Ph.D., Assistant Professor (*Human and Community Development*)

Mary Jackman, Ph.D., Professor

Carole E. Joffe, Ph.D., Professor (*Sociology, Women's Studies*)

Carl C. Jorgensen, Ph.D., Associate Professor

David J. Kyle, Ph.D., Assistant Professor

Ming-Cheng Lo, Ph.D., Assistant Professor

Lyn H. Lofland, Ph.D., Professor

Donald A. Palmer, Ph.D., (*Management*)

Belinda Robnett, Ph.D., Associate Professor

(*Sociology, Women's Studies*)

Kimberlee A. Shauman, Ph.D., Assistant Professor

Xiaoling Shu, Ph.D., Assistant Professor

Vicki Smith, Ph.D., Associate Professor

Judith Stacey, Ph.D., Professor (*Sociology, Women's Studies*)

John H. Stanfield, Ph.D., (*African American and African Studies, Sociology*)

John T. Walton, Ph.D., Professor (*Anthropology, Sociology*)

Diane L. Wolf, Ph.D., Associate Professor

### Emeriti Faculty

Bruce M. Hackett, Ph.D., Professor Emeritus

John F. Lofland, Ph.D., Professor Emeritus

Leon H. Mayhew, Ph.D., Professor Emeritus

Julius A. Roth, Ph.D., Professor Emeritus

John F. Scott, Ph.D., Professor Emeritus

## 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 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. Students are encouraged to consider the Education Abroad Program for their junior year, 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.

**Internships and 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 .....24-25

Sociology 1, 2, or 3; 46A and 46B (or the equivalents) .....12-13  
 Select units from Anthropology 2, 20 .....4  
 Select units from History 4A, 4B, 4C, 8, 9A, 9B, 10, 15, 16, 17A, 17B .....4  
 Select units from Philosophy 5, 6, 14 .....4

#### Depth Subject Matter .....44

A. Sociology 100 .....4  
 B. Select one course from each of the following four clusters .....16

##### *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 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

##### *Individual, Culture and Society:*

Sociology 120, 122, 125, 126, 127, 128, 129, 131, 132, 134, 135, 143B, 148, 150, 152, 172, 173, 175, 176

##### *Stratification and Social Differentiation:*

Sociology 118, 128, 129, 130, 132, 133, 134, 140, 145A, 145B, 172, 185, 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

##### *Organizations and Institutions:*

Sociology 118, 119, 124, 131, 133, 139, 144, 146, 149, 150, 154, 155, 159, 180A, 180B, 181, 182, 183, 185

##### *Social Dynamics:*

Sociology 123, 125, 138, 141, 143A, 145A, 145B, 147, 148, 156, 157, 170

##### *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.

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, 194HA-194HB.

#### Total Units for the Major .....68-69

(General emphasis)

#### Law and Society emphasis:

UNITS

#### Preparatory Subject Matter .....29

Sociology 1, 3; 46A and 46B (or the equivalents†) .....17  
 Select units from Anthropology 2, 20 .....4  
 Select units from History 4A, 4B, 4C, 8, 9A, 9B, 10, 15, 17A, 17B .....4  
 Select units from Philosophy 5, 14 .....4

#### Depth Subject Matter .....44

Sociology 100 .....4  
 Select units from Sociology 125, 126, 135...4  
 Select units from Sociology 130, 132, 140...4  
 Select units from Sociology 118, 131, 146, 180A .....4  
 Sociology 155 .....4  
 Select units from Sociology 120, 150, 152...8  
 Select units from Sociology 118, 148, 156, 157; no more than one of the following courses: Philosophy 119, Political Science 122, 154, Environmental Science and Policy 161; no more than one of the following courses: African American and African Studies 121, 145, Asian American Studies 155, Chicana/o Studies 130, 132, Native American Studies 117, 118.....12  
 Select from Sociology 190X, 192, 194HA-194HB .....4  
 (Required prerequisite: senior standing and completion of Sociology 100 and 8 units from Sociology 118, 125, 126, 130, 132, 135, 140, 146, 180A.)

#### Total Units for the Major .....73

(Law and Society option)

#### Social Services emphasis:

UNITS

#### Preparatory Subject Matter .....28

Sociology 2, 3; 46A and 46B (or the equivalents†) .....16  
 Psychology 1 .....4  
 Select units from African American and African Studies 10, 15; Asian American Studies 1, 2; Chicano Studies 10, 20; Native American Studies 10, 70.....8

#### Depth Subject Matter .....44

Sociology 131, 140, 185 .....12  
 Select units from upper division human psychology .....4  
 Select seven courses distributed as specified .....28

##### *Social Issues:*

Sociology 119, 120, 122, 124, 139, 143A, 144, 146, 150, 152, 154, 155, 170 .....8

##### *Social Interaction:*

Sociology 126, 127, 128, 143B, 148, 157 .....4

##### *Race and Ethnicity:*

African American and African Studies 100; Community and Regional Development 176; Asian American Studies 110, 111, 150; Chicano Studies 110; Native American Studies 112, 124; Sociology 129, 130 134 .....4

##### *Gender:*

Sociology 132, 133, 145B, 172 .....4

##### *Organizational Behavior:*

Sociology 158, 180A, 180B, 181, 182, 183 .....4

##### *Methodology:*

Sociology 103, 106 (or the equivalents†), 192, 194HA, 194HB .....4

#### Total Units for the Major .....72

(Social Services option)

### Comparative Studies and World Development emphasis:

UNITS

#### Preparatory Subject Matter .....30-57

Sociology 1; 46A and 46B (or the equivalents†) .....13  
 Economics 1A, 1B .....10  
 Anthropology 2 .....4  
 At least 4 units from Geography 2-2G, History 10, Political Science 2 .....4  
 Course work in language instruction in modern foreign language equivalent to 26 units at UC Davis .....26

#### Depth Subject Matter .....48

Sociology 100, 141, 145A, 170 .....16  
 Economics 115A, Anthropology 126 .....8  
 At least twelve units from Sociology 118, 130, 131, 143A, 144, 145B, 156 .....12  
 Regional focus, three courses from one of the following groups .....12

##### (a) *Africa/Middle East:*

Anthropology 140A, 140B, 142, Economics 175, Geography 125A, 125B, History 115A, 115B, 115C, 116, Political Science 134, 146

##### (b) *Latin America/Pacific:*

Anthropology 144, 147, Geography 122A, 122B, History 161A, 161B, 162, 165, Spanish 135, 136

##### (c) *Asia:*

Anthropology 149, Economics 171, 172, 173, Geography 126, 127, History 193, 194A, 194B, 194C, Political Science 138, 148A, 148B, Religious Studies 168, 172, Sociology 147

#### Total Units for the Major .....79-105

(Comparative Studies and World Development)

### Sociology—Organizational Studies

#### A.B. Degree Requirements:

UNITS

#### Preparatory Subject Matter .....27

Sociology 1, 2, 46A, 46B (or Statistics 13) .....17  
 Economics 1A, 1B .....10

#### Depth Subject Matter .....44

Sociology 180A, 180B .....8  
 Sociology 106 .....4  
 Select units from Psychology 183, Communication 130, 136 .....4

## 414 Sociology

Select 16 units from one of the following two clusters and select 4 units from the other cluster .....20

### (1) Public Administration

Community and Regional Development 158, 163, 168, Economics 151B, Political Science 107, 180, 181, 183, 187, 188, Sociology 103, 181.

### (2) Business and Society

Agricultural and Resource Economics 112, American Studies 125, Community and Regional Development 162, 164, Economics 116, 121A, 1231B, History 187A, 187B, 194D, Sociology 138, 139, 159, 183.

Select units from Sociology 128, 130, 132, 140, 145A, 145B, 172 .....4

Select from Sociology 190X, 192, 194HA-194HB .....4

(Required prerequisite for 190X or 192: senior standing and completion of all major requirements other than 12 units of the cluster requirements.)

**Total Units for the Major** .....71

**Major Advisers.** Consult the Departmental Advising Office, 1282 Social Sciences and Humanities Building.

## Minor Program Requirements:

Students in other disciplines may elect to minor in Sociology by choosing a sociological subject emphasis listed below. On transcripts, the minor will appear as a minor in Sociology.

UNITS

**Sociology** .....20

### Sociology—General emphasis

Select units from Sociology 100, 126, 140, 170, 180A .....8

One course from three clusters (see cluster lists under Sociology Major—General Emphasis) .....12

### Sociology—Organizational Studies emphasis

Sociology 180A and 180B .....8

Select units from Agricultural and Resource Economics 112, American Studies 125, Communication 134, 136, Community and Regional Development 162, 163, 164, Economics 100, Political Science 180, 181, 183, 187, 188, Psychology 183 .....8

Select units from Anthropology 122, History 174A, 179, 187A, 187B, 194D, Sociology 118, 139, 141, 156, 159, 175, 181, 183...4

### Sociology—Social Service emphasis

Sociology 185, plus 4 units selected from Sociology 131, 132, 133, 145B .....8

Four units from Sociology 129, 130, 133, 134, 140, 172 .....4

Four units from Social Issues cluster and four units from Social Interaction cluster (See cluster lists under Sociology Major—Social Services emphasis) .....8

### Sociology—Law and Society emphasis

Sociology 155, plus 4 units selected from Sociology 120, 150, 152 .....8

Four units from Sociology 129, 130, 131, 132, 133, 134, 172 .....4

Four units from Sociology 118, 139, 140, 141, 145A or 145B, 180A or 180B, 185 .....4

Four units from Sociology 100, 122, 124, 126, 128, 143A or 143B, 156, 157, or 191 .....4

**Minor Advisers.** Consult the departmental Advising Office, 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 3.5 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, 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.

**Graduate Study.** The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information and applications regarding graduate study may be obtained at the department office.

Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Women's Studies, Social Theory and Comparative History, or Native American Studies. See these headings for further details on these interdisciplinary programs.

**Graduate Advisers.** Consult the Graduate Administrative Assistant, 1289 Social Sciences and Humanities Building.

## Courses in Sociology (SOC)

### Lower Division Courses

#### 1. Introduction to Sociology (5) I. The Staff; III.

Kyle

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.

#### 2. Self and Society (4) I. L. Lofland; II, III.

The Staff

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.

#### 3. Social Problems (4) I, II. The Staff; III. Smith

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.

#### 4. Immigration and Opportunity (4) III. Cramer

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.

#### 5. Global Social Change: An Introduction to Macrosociology (4) I. Goldstone

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.

#### 25. Sociology of Popular Culture (4) II. The Staff

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.

#### 46A. Introduction to Social Research (4)

I. Lo; II. Kyle

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.

#### 46B. Introduction to Social Research (4) II.

Felmler; III. Shu

Lecture—3 hours; discussion—1 hour or term paper or research project. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

#### 90X. Lower Division Seminar (1-2) I, II, III.

The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 100. Classical and Modern Sources of Sociological Theory (4) II. Hall; III. The Staff

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Historical introduction of sociological thought, with special reference to its 19th-century origins and 20th-century lines of development. Consideration of theoretical texts may include works of Marx, Durkheim, Simmel, early critical theorists, Parsons, and the Chicago School. Not open for credit to students who have received credit for course 165A. GE credit: Wrt.

#### 103. Evaluation Research Methods (4) II.

The Staff

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.

#### 106. Intermediate Social Statistics (4) I.

Shauman; III. Shu

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.

#### 118. Political Sociology (4) I. Jackman; III.

The Staff

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.

#### \*119. Peace Institutions (4) II. J. Lofland

Lecture—3 hours; discussion—1 hour or term paper or project. Survey and analysis of private and public groups and organizations working for world peace by means other than preparing for war or supporting such preparations. Particular focus on peace institutions in the political, economic, scientific, religious, and educational realms.

#### 120. Deviance (4) I. The Staff; II. Grattet

Lecture—3 hours; term paper or discussion. Social structural sources, institutional practices and micro-processes 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.

**122. Sociology of Adolescence (4) III. The Staff**  
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.

#### \*123. American Society (4) I. The Staff

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) I. The Staff  
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.

**125. Sociology of Culture** (4) III. Hall  
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. Offered in alternate years. GE credit: SocSci.

**126. Social Interaction** (4) I. The Staff  
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.

**127. Sociology of Death** (4) III. L. Lofland  
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) I, II. Jorgensen  
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.

**129. Sociology of Black Experience in America** (4) I. Robnett  
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.

**130. Race Relations** (4) I, III. Jorgensen  
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.

**131. The Family** (4) I. The Staff; II. Shauman; III. Wolf  
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.

**132. The Sociology of Gender** (4) I. Felmlee; II. Robnett  
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 histori-

cal and comparative perspective. Offered in alternate years. GE credit: SocSci, Div.

**\*133. Sexual Stratification and Politics** (4) II. The Staff  
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) II. The Staff  
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) II. Felmlee  
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. Offered in alternate years. GE credit: Div, Wrt.

**138. Economic Sociology** (4) II. Block  
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. Offered in alternate years.

**139. Corporations and Society** (4) I. Block  
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.

**140. Social Stratification** (4) I. Shauman; II. Shu  
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.

**141. Industrialization and Social Change** (4) I. The Staff  
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.

**\*142. Sociology of Transportation** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transportation. Consequences of transport mode development on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

**143A. Urban Society** (4) I. Stanfield  
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.

**\*143B. Sociology of City Life** (4) I. L. Lofland  
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.

**\*144. Agriculture and Society** (4) Walton, Wolf  
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.

**\*145A. Sociology of Third World Development** (4) II. Kyle  
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.

**145B. Gender and Rural Development in the Third World** (4) III. The Staff  
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.

**146. Sociology of Religion** (4) II. Hall  
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.

**147. Sociological Perspectives on East Asia** (4) III. Lo  
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.

**148. Collective Behavior** (4) I. Goldstone  
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.

**\*149. Religion and American Society** (4) II. Hall  
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.

**150. Criminology** (4) I, III. Cohen  
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.

**152. Juvenile Delinquency** (4) II. Cohen; III. The Staff  
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.

**154. Sociology of Health Care** (4) II. Joffe  
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.

**155. Sociology of Law** (4) I. The Staff; II. Grattet  
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.

**156. Social Movements** (4) I. Lo; III. Goldstone  
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.

**\*157. Social Conflict** (4) III. J. Lofland  
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.

**\*158. Consumer-Vendor Relationships** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Examine the relationship between consumers and the vendors of goods and services using case materials, student projects, and relevant literature in sociology and related fields. Emphasis will be on organizational structure and bargaining power.

**\*159. Sociology of Occupations** (4) III. Smith  
Lecture—3 hours; discussion—1 hour or term paper or research project. Natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics.

**\*170. Population** (4) I. Cramer  
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.

**172. Ideology of Class, Race and Gender** (4) II. Jackman  
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.

**\*173. Sociology Through Literature** (4) Walton  
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. Offered in alternate years.

**174. Sociology of the Jewish Experience** (4) I. Wolf  
Seminar—3 hours; term paper. Prerequisite: upper division standing preferred. 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.

**\*175. Mass Communication** (4) III. Lofland  
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.

**\*176. Sociology of Knowledge** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour or term paper or research project. Critical analysis of the social founda-

tions of knowledge in society. The history, problems and dilemmas in classical sociology of knowledge. Contemporary applications. Natural and social sciences as social systems. Sociology of personal knowledge in everyday life.

**180A. Complex Organizations** (4) II. Smith  
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.

**180B. Complex Organizations** (4) III. Smith  
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) II. J. Lofland  
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.

**\*182. Experimental and Utopian Communities** (4) III. Hackett  
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) I. Biggart  
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.

**185. Sociology of Social Welfare** (4) II. Joffe; III. Block  
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.

**\*189. Social Science Writing** (4) II. Walton  
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. Offered in alternate years.

**190X. Seminar in Sociological Analysis** (4) III. Grattet  
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.

**\*191. Workshop in Contemporary Sociological Theory** (4) III. The Staff  
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.

**192. Internship and Research Practicum** (2-12) I, II, III. The Staff  
Internship—3-33 hours; discussion—1 hour. Prerequisite: upper division standing; course 46A; approval of proposed internship. Supervised internship and study in an agency, organization or institution; application of core concepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units of course 192 may be counted toward the Sociology major. (P/NP grading only.)

**194HA-194HB. Special Study for Honors Students** (4-4) I-II. Cramer  
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.)

**195. Special Topics in Sociological Analysis** (4) I. Cohen; III. The Staff  
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.

**197T. Tutoring in Sociology** (1-4) I, II, III. The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: open to seniors only. (P/NP grading only.)

## Graduate Courses

**201. Social Research** (4) II. Jackman  
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing, or consent of instructor. Survey of sociological inquiry, taught as practicum. Philosophy of social science; values and research; research agendas and research problem formulation; research process; explanation vs. interpretation; study design; concept formation, measurement, sampling, data acquisition, inference; rhetoric and presentation of findings.

**206. Quantitative Analysis in Sociology** (4) III. Cramer  
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.)

**\*207A-207B. Methods of Quantitative Research** (4-4) I. Feilmlee; II. Shauman  
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.)

**\*215. Economy, Polity, and Society** (4) III. Block  
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) I. Cohen

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.

**225. Cultural Sociology** (4) I. Hall

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) I. L. Lofland

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) II. Joffe

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) I. Jackman

Lecture—3 hours; 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) I. Wolf

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) II. Shauman

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) II-III. Walton

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. Offered in alternate years. (If taken as a sequence, deferred grading only, pending completion of sequence.)

**\*243. Urban Society** (4) L. Lofland

Seminar—3 hours; 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) III. Kyle

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) I. J. Lofland

Seminar—3 hours; 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) I. The Staff

Seminar—3 hours; 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) III. The Staff

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) I. Goldstone

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) III. Goldstone

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) II. Cramer

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) I. Smith

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) III. Joffe

Seminar—3 hours; term paper. (S/U grading only.)

**292A-292B. Field Research** (4-4) II-III. Wolf

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) I. The Staff

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.)

**295. Special Topics Seminar** (4) I. Felmler, II.

Block, Shu; III. Lo

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Research topics in sociology. Topic will vary according to faculty interest and student demand.

**298. Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Individual Study** (1-12) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

**Professional Courses**

**390A. The Teaching of Sociology** (2) II. The Staff  
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.)

**390B. The Teaching of Sociology** (2) III.

The Staff

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.)

**Professional Course**

**\*466. Research Paper Workshop** (2) I. The Staff  
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.)

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## Soil and Water Science

(College of Agricultural and Environmental Sciences)

**The Major Program**

Soil and water science is concerned with the use and protection of our land and water resources. The major teaches graduates sound scientific principles for managing soil and water resources to benefit both agriculture and the environment.

**The Program.** Major programs include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, and related environmental problems. (For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.)

**Internships and Career Alternatives.** Before they graduate, many students receive practical work experience through student internships with state and federal agencies, soil and plant labs, and growers. Students also have the opportunity to work on research projects with faculty members and to develop individual research or study topics. Graduates are qualified for managerial and technical positions with environmental and agricultural businesses. They are also prepared for positions in advising, planning, land appraisal, and research and teaching with private, government, and international organizations involved with soil and water development, use, and conservation. Some graduates also continue in master's and doctoral programs in soil science, water science, ecology, and plant physiology.



**B.S. Major Requirements:**

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

## UNITS

|                                                                                                                                                                                                      |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>English Composition Requirement</b> .....                                                                                                                                                         | <b>4-12</b>  |
| See College requirement .....                                                                                                                                                                        | 0-8          |
| Oral expression (Rhetoric 1) .....                                                                                                                                                                   | 4            |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                              | <b>74</b>    |
| Biological sciences (Biological Sciences 1A, 1B, 1C) .....                                                                                                                                           | 15           |
| Chemistry (Chemistry 2A-2B-2C and a more advanced course) .....                                                                                                                                      | 18           |
| Computer science (Agricultural Systems and Environment 21, Engineering 5) .....                                                                                                                      | 3            |
| Economics or agricultural economics (Economics 1A, 1B) .....                                                                                                                                         | 5            |
| Geology (Geology 50) .....                                                                                                                                                                           | 3            |
| Mathematics (Mathematics 16A, 16B) .....                                                                                                                                                             | 6            |
| Physics (Physics 7A-7B-7C) .....                                                                                                                                                                     | 12           |
| Statistics (Statistics 13, Agricultural Systems and Environment 120) .....                                                                                                                           | 4            |
| Additional physical sciences, biological sciences, and/or mathematics with approval of adviser .....                                                                                                 | 8            |
| <b>Breadth/General Education</b> .....                                                                                                                                                               | <b>15-33</b> |
| Satisfaction of General Education requirement .....                                                                                                                                                  | 6-24         |
| At least one upper division course from each of the following areas, with approval of adviser, (1) resource management, (2) environmental law, (3) environmental economics and decision making ..... | 9            |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                    | <b>30</b>    |
| Soil Science 100 .....                                                                                                                                                                               | 4            |
| Environmental and Resource Sciences 100 .....                                                                                                                                                        | 5            |
| Additional upper division units in soil science and hydrologic science .....                                                                                                                         | 21           |
| <b>Restricted Electives</b> .....                                                                                                                                                                    | <b>27</b>    |
| To supplement or expand areas of student interest selected with approval of adviser .....                                                                                                            | 24           |
| Special study or experience (192 or 199 course in the major area) .....                                                                                                                              | 3            |
| <b>Unrestricted electives</b> .....                                                                                                                                                                  | <b>4-30</b>  |
| <b>Total Units for the Degree</b> .....                                                                                                                                                              | <b>180</b>   |

**Major Adviser.** R. Dahlgren.

**Advising Center** for the major is located in 148 Hoagland Hall (530-752-1669).

**Graduate Study.** Graduate programs are available in Soil Science as well as Hydrologic Science. Detailed information can be obtained from the Graduate Adviser and the *Graduate Announcement*. See also the Graduate Studies chapter of this catalog.

**Courses.** For specific courses of instruction in this major, see course listings under Atmospheric Science, Plant Science, Environmental and Resource Sciences, Soil Science, and Hydrologic Science.

**Related Courses.** See courses in Agricultural and Resource Economics, Agricultural Systems and Environment, Agronomy, Chemistry, Biological and Agricultural Engineering, Civil and Environmental Engineering, Environmental Science and Policy, Environmental Toxicology, Geology, International Agricultural Development, Plant Biology, Range Science, and Vegetable Crops.

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## Soil Science

See **Geology; Soil Science, below; Soil Science (A Graduate Group); and Soil and Water Science**

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## Soil Science

(College of Agricultural and Environmental Sciences)

**Faculty**

See under the Department of Land, Air and Water Resources.

**Major Programs.** See the major in Soil and Water Science.

**Minor Program Requirements**

The Department of Land, Air and Water Resources, Soils and Biogeochemistry Program, offers a minor program in soil science for students in the Hydrologic Science, Environmental and Resource Sciences, Environmental Toxicology, Agricultural Systems and Environment, International Agricultural Development, and Environmental Biology and Management majors.

## UNITS

|                                                                                                                       |           |
|-----------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Soil Science</b> .....                                                                                             | <b>20</b> |
| Soil Science 100 .....                                                                                                | 4         |
| Courses selected from Soil Science 102, 105, 107, 109, 111, 118, 120, Plant Science 135, Hydrologic Science 124 ..... | 16        |

**Minor Adviser.** R.J. Southard.

**Graduate Study.** Programs of study leading to the M.S. and Ph.D. degrees in Soil Science are available. Information regarding these programs can be obtained from the graduate adviser and the *Graduate Announcement*. See also the Graduate Studies chapter of this catalog.

**Graduate Adviser.** L.E. Jackson (Vegetable Crops).

**Courses in Soil Science (SSC)**

*Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 148 Hoagland Hall (530-752-1669) or check the Soils and Biogeochemistry web site at <http://lawr.ucdavis.edu/>.*

**Lower Division Courses**

**10. Concepts of Soil Science** (3) I. Dahlgren  
Lecture—3 hours. Soils as natural bodies formed by interactive environmental processes; the global ecosystem; their response to use and management; conservation practices for sustainable use of soil resources; and the role of soils in current agricultural and environmental issues. Not open for credit to students who have successfully completed course 100 or similar introductory course in soil science. GE credit: SciEng, Wrt.

**92. Soil Science Internship** (1-12) I, II, III.  
The Staff (Chairperson in charge)  
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** (4) I. Singer  
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1A, and consent of instructor; Geology 50, Biological Sciences 1C, Microbiology 2, and Chemistry 8A recommended. Formation, properties and behavior of soils. Nature and interactions of solid, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soil development and geology, management, and conservation.

**102. Soil and Water Chemistry** (5) II. Zasoski  
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 slanting and solid-phase interactions.

**105. Field Studies of Soil Resources** (8) Extra-session summer. Dahlgren, Singer, Southard  
Fieldwork—daily for five weeks, off campus; lecture—1 week, on campus. Prerequisite: consent of instructor; course 120 recommended. Study of soils in the field throughout California. Emphasis on identification, description and classification of soils; relation of soils to geology, vegetation, climate and human activities; role of soils in land use and as components of California ecosystems.

**107. Soil Physics** (4) I. Rolston, Hopmans  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil physical properties on transfer processes.

**109. Nutrient Cycling and Management** (4) III. Horwath  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Plant nutrients in soil; effects of fertilizers, cover crops, compost and other amendments on plant productivity and soil quality; nutrient sustainability in alternative agricultural and natural ecosystems; soil fertility assays.

**111. Soil Microbiology** (4) II. Scow  
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.

**112. Soil Ecology** (3) I. Scow, Jaffee  
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 earthworm. Applications to restoration, remediation, ecosystem science, and agriculture. GE credit: Wrt.

**118. Soils in Land Use and the Environment** (4) III. Singer  
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.

**120. Soil Genesis, Morphology, and Classification** (5) III. Southard  
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.

**192. Soil Science Internship** (1-12) I, II, III.  
The Staff (Chairperson in charge)  
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) I, II, III.  
The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses**

**\*207. Transport Processes in Soils** (4) II. Rolston, Hopmans  
Lecture—3 hours; discussion/computer laboratory—2 hours. Prerequisite: course 107 and Mathematics 22B; knowledge of a computer programming language. Physical and mathematical description of

nonsteady transport processes in soil and the unsaturated zone. Emphasis on analytical and numerical solutions to water, gas, solute (contaminants), and heat transport processes and the chemical and biological reactions attenuating solute movement. Offered in alternate years.

**\*208. Soil-Plant Interrelationships** (3) II. Richards

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.

**209. Physiology and Ecology of Mycorrhizal Symbioses** (3) I. Bledsoe

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.

**\*211. Advanced Soil Microbiology** (3) III. Scow  
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.

**\*214. Soil Mineralogy** (5) III. Dahlgren  
Lecture—3 hours; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the common minerals in soils and rocks. Weathering reactions and stability of minerals in the weathering environment. Application of analytical methods in mineral analysis, including x-ray, microscopic and chemical analysis for characterization of mineral systems. Offered in alternate years.

**216. Physical Geochemistry** (3) I. Casey  
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.

**218. Soil Erosion and Conservation** (3) II. Singer

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.

**219. Ecosystem Biogeochemistry** (4) III. Dahlgren, Bledsoe

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.)

**220. Pedology** (3) II. Southard

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 once for credit. Offered in alternate years.

**222. Organic Chemistry of Soil** (3) II. Horwath  
Lecture—3 hours. Prerequisite: Chemistry 8A, 8B, Mathematics 16A, 16B, course 100 or the equivalent. Structure and function of soil organic matter, biochemistry of humic substance formation, relationship of organic matter to nutrient cycling and sustainability in agricultural and natural ecosystems, reactions of organics with humic substances in soil and water, methods for characterization. Offered in alternate years.

**290. Special Topics in Soil Science** (1) I, III. The Staff

Seminar—1 hour. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Soil Science (A Graduate Group)

Robert J. Zasoski, Ph.D., Chairperson of the Group  
Group Office, 148 Hoagland Hall (530-752-1669)

World Wide Web: <http://qavis.ucdavis.edu>

**Faculty.** Includes faculty members from the Departments of Biological and Agricultural Engineering; Agronomy and Range Science; Civil and Environmental Engineering; Land, Air, and Water Resources; Nematology; Pomology; Vegetable Crops; and Viticulture and Enology.

**Graduate Study.** The Graduate Group in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. Soil science focuses on the physical, chemical and biological processes that govern the quality and distribution of soils in relation to landform evolution, geochemical environments, and organism habitats. Research in soil science includes the study of soil as a global natural resource, as a critical component of the environment, and as a resource to sustain agricultural and wildland ecosystems. Students may specialize in environmental quality; soil physics; soil chemistry; soil genesis, morphology and classification; soil fertility and plant nutrition; soil microbiology and biochemistry; soil-plant-water relationships; or general soil science. For detailed information regarding the programs, address the chairperson of the group.

**Graduate Advisers.** P.H. Brown (Pomology), G.S. Pettygrove (Land, Air, and Water Resources).

**Graduate Admissions Officer.** L.E. Jackson (Vegetable Crops), 754-9116.

## Spanish

(College of Letters and Science)

Robert Blake, Ph.D., Chairperson of the Department  
Department Office (Spanish and Classics), 616

Sproul Hall (530-752-0835)

World Wide Web: <http://spanish.ucdavis.edu>

### Faculty

Marta E. Altisent, Ph.D., Associate Professor  
Samuel G. Armistead, Ph.D., Professor  
Robert Blake, Ph.D., Professor  
Cecilia Colombi, Ph.D., Associate Professor  
Linda Egan, Ph.D., Assistant Professor  
Cristina González, Ph.D., Professor  
Neil Larsen, Ph.D., Associate Professor

Adrienne Martín, Ph.D., Assistant Professor  
Almerindo E. Ojeda, Ph.D., Associate Professor  
(Linguistics)

Robert M. Scari, Ph.D., Professor  
Máximo Torreblanca, Ph.D., Professor (Linguistics)  
Hugo J. Verani, Ph.D., 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

### 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 traditions.

**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 criticism and to the four areas of study represented in the department's curriculum: Spanish linguistics, Spanish literature, Spanish-American literature, and Hispanic 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.

**Career Alternatives.** The program, alone or in combination with other major programs, may lead to advanced study of the language or literature 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, or business.

## A.B. Major Requirements:

UNITS

### Preparatory Subject Matter .....4-37

Spanish 1, 2, 3, 21, 22, 23, and 240-33  
or Spanish 31, 32, 33 .....0-15  
Spanish 21, 22, and 23 may be taken in the EAP Taxco or Morelia programs.  
Course 23 may be substituted by an equivalent course taken on EAP.

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 .....4  
Spanish 111N, 115N, or 116 .....3-4  
Spanish 130, 131N, or 134N .....4  
Spanish 150N, 151N, or 157 .....4  
Spanish 117, 174, or 176 .....4  
Students planning to take Spanish 110 should do so at the beginning of the upper division sequence or concurrently with Spanish 100.

Seven elective courses to be chosen in consultation with the student's major adviser

26-28  
Several electives may be taken with EAP, preferably concentrated in two of the following areas. Other combinations are possible with the approval of the major adviser:

- (a) Spanish literature,
- (b) Spanish-American literature,
- (c) Chicano/Latino literature,
- (d) Spanish linguistics

Students may, with the approval of their adviser, take up to three elective courses outside the Spanish department in such programs as Anthropology (e.g., Anthropology 144), Chicana/o Studies (e.g., Chicana/o Studies 154, 155, 156), Comparative Literature, History (e.g., History 161A, 161B, 164, 165, 166A, 166B, 168W, 169A, 169B), and Linguistics (e.g., Linguistics 115, 116).

**Total Units for the Major** .....49-85

**Major Advisers.** M.E. Altisent, C. Colombi, A. Martín, R.M. Scari (Master Adviser).

**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 .....4
- Spanish 111N, 115N, or 116 .....3-4
- Spanish 130, 131N, or 134N .....4
- Spanish 150N, 151N, or 157 .....4
- Spanish 117, 174, or 176 .....4
- One upper division elective in Spanish .....4

As many as, but no more than three of the required upper division courses for the minor may be completed with EAP. Consult a departmental adviser.

**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 3.5 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 as described below.

**Teaching Credential Subject Representative.** C. Colombi. See also under Teacher Education Program.

**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 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 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 or 100.*

#### Lower Division Courses

**1. Elementary Spanish (5) I, II, III.** The Staff  
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. (Students who have successfully completed Spanish 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.)

**2. Elementary Spanish (5) I, II, III.** The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

**3. Elementary Spanish (5) I, II, III.** The Staff  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

**8. Elementary Spanish Conversation (2) I, II, III.** The Staff  
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.

**21. Intermediate Spanish (5) I, II, III.** The Staff  
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3. Designed to review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. It is recommended that students transferring from other institutions start the second-year program at this point. (Former course 4.)

**22. Intermediate Spanish (5) I, II, III.** The Staff  
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21. Continuation of Spanish 21. Focus on more difficult grammatical concepts and further practice in composition. Development of all language skills through exercises and reading of modern texts. (Former course 5.)

**23. Spanish Composition I (4) I, II, III.** Colombi in charge  
Lecture—3 hours; frequent writing assignments. 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.

**24. Spanish Composition II (4) I, II, III.** Colombi in charge  
Lecture—3 hours; term paper. 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.

**28. Intermediate Spanish Conversation (2) I, II, III.** Blake in charge  
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.)

**31. Intermediate Spanish for Native Speakers I (5) I.** The Staff  
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.

**32. Intermediate Spanish for Native Speakers II (5) II.** The Staff  
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.)

**33. Intermediate Spanish for Native Speakers III (5) III.** The Staff  
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.)

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

Course 100 is prerequisite to all upper division literature courses.

**100. Principles of Hispanic Literature and Criticism (4) I, II, III.** Altisent, Egan, Martín, Scari, Verani

Lecture—3 hours; term paper. 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.

**110. Advanced Spanish Composition (4) I, II, III.** Scari  
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.)

**111N. The Structure of Spanish: Sounds and Words (3) I, II, III.** The Staff  
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.)

**112N. The Structure of Spanish: Words and Phrases (3) II, III.** Blake, Ojeda  
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.)



**113. Spanish Pronunciation (3)** I, II. Torreblanca  
Lecture—3 hours. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers. (Former course 133.)

**114N. Contrastive Analysis of English and Spanish (4)** III. Colombi, Ojeda

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.)

**115N. How Spanish Grew: Its Origins and Development (4)** I, II. Blake, Torreblanca

Lecture—3 hours; term paper. Prerequisite: course 24 or 33 and Linguistics 1, or consent of instructor. The Spanish language from its roots in spoken Latin to modernity. Course stresses the close relationship between historical events and language change, as well as the role that literature plays in language standardization.

**116. Applied Spanish Linguistics (4)** I, II. Blake, Colombi

Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. An exploration of the major theoretical and practical issues concerning learning Spanish as a second language. Especially designed for students interested in teaching Spanish as a career.

**117. Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4)** I. Colombi, Alarcón

Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor; course 116 and Linguistics 116 recommended. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the main Spanish-speaking populations in the U.S.; applied language teaching methodologies in the context of teaching Spanish to native speakers at different levels. Conducted primarily in Spanish.

**118. Topics in Spanish Linguistics (4)** III. The Staff

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 once for credit when topic differs.

**123. Creative Writing in Spanish (4)** III. Alarcón  
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.

**130. Survey of Spanish Literature to 1700 (4)** I. Armistead, Martín

Lecture—3 hours; term paper. Prerequisite: course 100. 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. (Part of former courses 103A and 103B.)

**131N. Survey of Spanish Literature: 1700 to Present (4)** II. Altisent, Scari

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. 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.)

**132N. Medieval and Renaissance Spanish Literature (4)** I. Armistead

Lecture—3 hours; term paper. Prerequisite: course 100. Introduction to the study of the principal works

and authors of Medieval and early 16th-century Spanish literature. (Part of former courses 112 and 103A.)

**133N. Golden Age Literature of Spain (4)** I. Martín

Lecture—3 hours; term paper. Prerequisite: course 100. Introduction to the study of the principal authors and literary movements of 16th- and 17th-century Spain and Spanish American colonial literature. (Part of former courses 103B, 109 and 115.)

**134N. Don Quijote (4)** II. Martín

Lecture—3 hours; term paper. Prerequisite: course 100. A critical reading of *Don Quijote* by Cervantes. Focused interpretations of important passages and characters in the context of the socio-cultural background of the period. *Don Quijote* as prototype for the modern novel. Offered in alternate years. (Former course 111.)

**135N. Spanish Romanticism (4)** III. Scari

Lecture—3 hours; term paper. Prerequisite: course 100. 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.)

**136N. The Spanish Novel of the 19th Century (4)** II. Scari

Lecture—3 hours; term paper. Prerequisite: course 100. Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós. The unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque. (Former course 119.)

**137N. Twentieth-Century Spanish Fiction (4)** III. Altisent

Lecture—3 hours; term paper. Prerequisite: course 100 or 131. 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. (Former course 120A.)

**138N. Modern and Contemporary Spanish Poetry (4)** III. Altisent

Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Alexandre, Hernández Hierro and others. Offered in alternate years. (Former course 120C.)

**139. Modern Spanish Theater (4)** I. Altisent

Lecture—3 hours; term paper. Prerequisite: course 100. 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. (Former course 120B.) GE credit: ArtHum, Div.

**140N. Modern Spanish Essay (4)** II. Scari

Lecture—3 hours; term paper. Prerequisite: course 100. Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers.

**141. Spanish Culture (4)** III. The Staff

Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 24 or 33. The development of Spanish culture(s) from the Romans to the present, focusing on important historical periods. Topics include art, history of ideas, and everyday cultural manifestations. (Former course 134.) Offered in alternate years. GE credit: ArtHum, Div.

**142. Special Topics in Spanish Cultural and Literary Studies (4)** I, II, III. The Staff

Lecture—3 hours; term paper. Prerequisite: course 100. Special topics in the study of Spanish literature and culture. May be repeated twice for credit when topic differs. (Part of former course 151.)

**148. Cinema in the Spanish-Speaking World in Translation (4)** I. Altisent, Colombi, Larsen

Lecture—3 hours; film viewing—3 hours. Prerequisite: completion of the Subject A requirement. 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 cine-

matography required. Films with subtitles. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

**149. Latin-American Literature in Translation (4)** III. Larsen, Verani

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.

**150N. Survey of Spanish-American Literature to 1900 (4)** I. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Spanish American literature from prehispanic texts and the Chronicles of the Conquest to Romanticism and Modernism. Reading selections include fiction, poetry, drama and essays. (Former course 105A.)

**151N. Survey of Spanish-American Literature 1900 to Present (4)** II. Egan, Larsen, Verani

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.)

**153. Spanish-American Short Story (4)** I. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Spanish-American short story during the 19th and 20th centuries. Emphasis on the contemporary period. Offered in alternate years. (Former course 128.)

**154. Spanish-American Novel (4)** II. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Spanish-American novel during the 19th and 20th centuries. Emphasis on significant contemporary works. Offered in alternate years. (Part of former courses 108A and 108B.)

**155. Mexican Novel (4)** II. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Mexican novel during the 19th and 20th centuries. Emphasis on the narrative of the Revolution and significant contemporary works. (Former course 129.)

**156. Darío, Modernism and Its Legacy (4)** II. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. 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 Modernist writers. Offered in alternate years. (Former course 125.)

**157. 20th Century Masters in Spanish-American Literature (4)** III. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Study of major 20th-century Spanish-American writers and their cultural and literary milieus. Offered in alternate years. (Part of former courses 127 and 138.)

**158. Spanish-American Poetry: From Vanguardism to Surrealism and Beyond (4)** II. Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Study of vanguardism, surrealism, and more recent movements of 20th-century poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Octavio Paz. Offered in alternate years.

**159. Special Topics in Spanish-American Literature and Culture (4)** I, II, III. Egan, Larsen, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Special topics in the study of Spanish-American literature and culture. May be repeated twice for credit when topic differs. Offered in alternate years.

**170. Spanish-American Culture (4)** III. The Staff

Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 24 or 33. Major developments in the arts and social institutions of Spanish America and areas other than Mexico. Readings, lectures and discussions in Spanish. (Former course 136.) GE credit: ArtHum, Div.

**171. Music from Latin America** (4) I. Ortiz  
Lecture—3 hours; discussion—1 hour. Prerequisite: Spanish 24 or 33. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica norterna, musica andina) as well as its implications in other musical genres. Taught in Spanish. For non-majors. Offered in alternate years. (Same course as Music 127.)

**172. Mexican Culture** (4) III. Egan  
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 24 or 33. The development of Mexican culture from the Aztec-Mayan era to the present. Study includes important periods such as the Conquest and Colonialism, the Independence movement, and changes from the Revolution to contemporary Mexico. Reading, lectures and discussions in Spanish. (Former course 135.) GE credit: ArtHum, Div.

**174. Chicano Culture** (4) II. Alarcón  
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.

**176. Literature in Spanish Written in the United States** (4) III. Alarcón  
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.

**192I. Internship in Spanish** (1-12) I, II, III.  
The Staff (Chairperson in charge)  
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) I, II, III. The Staff

Independent study—3-15 hours. Prerequisite: open only to majors with 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 Spanish literature, civilization, or language studies. May be repeated for a minimum of 6 units over at least two quarters. (P/NP grading only.)

**197T. Tutoring in Spanish** (1-4) I, II, III. The Staff  
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) I, II, III. The Staff  
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) I, II, III.  
The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

## Graduate Courses

**201. Literary Theory I** (4) II. The Staff  
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.

**202. Literary Theory II** (4) III. The Staff  
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.

**205. Spanish Phonology** (4) II. Torreblanca  
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.

**206. Spanish Syntax** (4) I. Blake, Ojeda  
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.

**207. History of the Spanish Language** (4) I, III. Blake, Torreblanca  
Seminar—3 hours; term paper. Prerequisite: Latin 1. (Former course 220A.)

**208. Old Spanish Texts** (4) II. Torreblanca, Blake  
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.

**211. Hispanic Dialectology** (4) III. Torreblanca  
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.)

**212. Applied Linguistics** (4) II. Colombi, Blake  
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.

**215. Special Topics in Hispanic Linguistics** (4) III. The Staff  
Seminar—3 hours; term paper. Prerequisite: consent of instructor; courses 205, 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.

**222. Critical Approaches to Spanish Literature I: Prose and Essay** (4) II. Altisent, Armistead, Martin, Scari  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish narrative and the essay.

**223. Critical Approaches to Spanish Literature II: Poetry and Drama** (4) II. Altisent, Armistead, Martin  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish poetry and drama.

**224. Studies of a Major Writer, Period, or Genre in Spanish Literature** (4) III. The Staff  
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.

**252. Medieval Spanish Literature: Prose** (4) I. Armistead  
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.

**253. Medieval Spanish Literature: Epic** (4) II. Armistead  
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.

**254. Medieval Hispanic Lyric** (4) II. Armistead  
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 provençal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric.

**255. Spanish Literature of the Early Renaissance** (4) I. Armistead, Martín  
Seminar—3 hours; term paper. Spanish Literature, 1450-1550, with emphasis on *La Celestina*. (Former course 229.)

**256. Spanish Literature of the Renaissance and Golden Age: Poetry** (4) I. Martín  
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).

**257. Spanish Literature of the Renaissance and Golden Age: Drama** (4) I. Martín  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and 17th century literary and cultural developments through the study of selected dramas.

**258. Spanish Literature of the Renaissance and Golden Age: Prose** (4) I. Martín  
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.

**259. Cervantes and the Novel** (4) I. Martín, Armistead  
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*.

**260. Modern Spanish Literature** (4) I. Scari, Altisent  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920.

**261. Contemporary Spanish Literature: Poetry** (4) I. Altisent  
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.

**262. Contemporary Spanish Literature: Narrative** (4) I. Altisent  
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 post-modern trends.

**263. Contemporary Spanish Literature: Drama** (4) I. Altisent  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years.

**264. Contemporary Spanish Literature: Essay** (4) III. Scari  
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in alternate years.

**265. Women Writers of Spain** (4) I. Altisent  
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, psycho-

analytical, and metafictional, erotic, and allegorical fiction.

**272. Critical Approaches to Spanish-American Literature: Narrative** (4) I. Egan, Larsen, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in narrative (novel, short story, and essay), from early Colonial times to the present.

**273. Critical Approaches to Spanish-American Literature: Poetry and Drama** (4) I. Egan, Larsen, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in poetry and drama, from early Colonial times to the present.

**274. Studies of a Major Writer, Period, or Genre in Spanish-American Literature** (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish-American 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.

**275. Colonial Literature** (4) I. Egan 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.

**276. Twentieth-Century Spanish-American Drama** (4) III. The Staff Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sánchez to the present. Offered in alternate years. (Former course 240.)

**277. Spanish-American Novel, 1900-1950** (4) I. Egan, Larsen, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Spanish America in the first half of the 20th century. Offered in alternate years. (Former course 241A.)

**278. New Trends in Spanish-American Fiction** (4) II. Egan, Larsen, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent developments in Spanish-American narrative. Emphasis on innovative language and structure. Offered in alternate years. (Former course 241B.)

**279. Mexican Narrative** (4) III. Egan, Larsen, Verani 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.

**280. Spanish-American Short Story** (4) III. Egan, Larsen, Verani 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.)

**281. Spanish-American Women Writers** (4) I. Egan, Verani 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.

**282. Darío and Modernism** (4) I. Egan, Larsen, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1930). Offered in alternate years. (Former course 245.)

**283. New Directions in Spanish-American Poetry** (4) III. Egan, Larsen, Verani Seminar—3 hours; term paper. Offered in alternate years. (Former course 247.)

**284. The Spanish-American Essay** (4) II. Egan,

Larsen, Verani Seminar—3 hours; term paper. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in alternate years. (Former course 248.)

**298. Group Study** (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Courses**

**300. The Teaching of Spanish** (3) III. The Staff Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

**390. Problems in Teaching Spanish at the College Level** (4) III. The Staff Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

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## Statistics

(Intercollege Division)

George G. Roussas, Ph.D., Chairperson of the Division and Associate Dean of Statistics  
 Division Office, 380 Kerr Hall (530-752-2361)  
 World Wide Web: <http://www-stat.ucdavis.edu>

**Faculty**

Prabir Burman, Ph.D., Professor  
 Christiana Drake, Ph.D., Associate Professor  
 Juanjuan Fan, Ph.D., Assistant Professor  
 Ian P. Fenech, Ph.D., Associate Professor  
 Wesley O. Johnson, Ph.D., Professor  
 Richard A. Levine, Ph.D., Assistant Professor  
 Yue-Pok (Ed) Mack, Ph.D., Professor  
 Hans-Georg Mueller, Ph.D., Professor  
 George G. Roussas, Ph.D., Professor  
 Francisco J. Samaniego, Ph.D., Professor  
 Robert H. Shumway, Ph.D., Professor  
 Jessica M. Utts, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 Jane-Ling Wang, Ph.D., Professor

**Emeriti Faculty**

P.K. Bhattacharya, 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, social, engineering, and medical sciences.

**The Program.** Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. The A.B. degree is very flexible, facilitating a double major or extensive elective course work in a field in which statistics is applied. The B.S. degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied course work and underscore the strong interdependence of statistical theory and the applications of statistics.

**Preparatory Requirements.** Before applying for either the A.B. or B.S. major in Statistics, students must ordinarily complete the following courses with at least C grades:

Mathematics 21A, 21B, 21C  
 Mathematics 22A, 22B  
 Computer Science Engineering 30 or Engineering 5  
 Statistics 32

In addition, due to space limitation in the B.S. major, students admitted to this major will normally be chosen from those having at least a 3.0 grade point average in the above courses. For further information, please contact a Statistics adviser.

**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. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

### A.B. Major Requirements:

UNITS

**Preparatory Subject Matter** .....**24-25**  
 Calculus, Mathematics 21A, 21B, 21C ..... 12  
 Linear algebra, differential equations, Mathematics 22A, 22B ..... 6  
 Computer science, Computer Science Engineering 30 or Engineering 5 (or the equivalent) ..... 3-4  
 Statistics through computers, Statistics 32 ..... 3

**Depth Subject Matter** .....**38-39**  
 Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent ..... 8  
 Probability and mathematical statistics, Statistics 131A, 131B, 131C ..... 12  
 Three Statistics courses with Statistics 131B as a prerequisite ..... 9-10  
 Related elective courses ..... 9  
 Three upper division courses approved by major adviser. They may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

**Total Units for the Major** .....**62-64**

### B.S. Major Requirements:

UNITS

**Preparatory Subject Matter** .....**24-31**  
 Calculus, Mathematics 21A, 21B, 21C ..... 12  
 Linear algebra; differential equations, Mathematics 22A, 22B ..... 6  
 Computer science:  
*General option:* Computer Science Engineering 30 or Engineering 5 (or the equivalent) ..... 3-4  
*Computer Science option:* Computer Science Engineering 30 and 40 and Electrical and Computer Science Engineering 70 ..... 10

Statistics through computers, Statistics 32 ..... 3  
**Depth Subject Matter**  
 Complete one of the two options below.

**Statistics—General option** .....**51-54**  
 Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent ..... 8  
 Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C or the equivalent ..... 12  
 Four Statistics courses having Statistics 131B as a prerequisite ..... 12-13  
 Linear algebra, Mathematics 167 ..... 3



## 424 Statistics

Three upper division Mathematics courses selected from 108, 127A-127B-127C, 128A-128B-128C, 168 (Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics.) .....10-12  
Related elective courses .....6  
Two upper division courses approved by major adviser. These may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

**Total Units for the Major** .....75-85  
(General option)

### Statistics—Computer Science option .....49-53

Analysis of variance, multiple regression, Statistics 106, 108 (or the equivalent) .....8  
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C .....12  
Two courses having Statistics 131B as a prerequisite .....6-7  
Statistical computing, Statistics 141 .....3  
Operating systems and System programming, Computer Science Engineering 150 .....4  
Data structures, Computer Science Engineering 110 .....4  
Data base systems, Computer Science Engineering 165 or Mathematics 160 .....3-4  
Mathematics, two courses from Mathematics 128A, 128B, 132A, 132B, 167, 168 .....6-8  
Computer Science Engineering 122, or Computer Science Engineering 175 .....3

**Total Units for the Major** .....73-84  
(Computer Science option)

**Major Adviser.** A.P. Fenech.

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 Division 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** .....19-20  
Statistics 106, 108, and 130A-130B or 131A-131B .....16  
One course in Statistics having Statistics 130B or 131B as a prerequisite .....3-4  
Preparation: Statistics 13 or 32.

**Graduate Study.** The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Division of Statistics.

**Graduate Adviser.** W.O. Johnson, fall;  
J.-L. Wang, winter and spring.

**Statistical Consulting.** The Division 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** (3) III. The Staff  
Lecture—3 hours. 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, etc.; understanding probability, risk and odds. GE credit: SciEng or SocSci, Wrt.

#### \*12. Introduction to Discrete Probability

 (3) I. The Staff

Lecture—3 hours. 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) I, II, III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra or the equivalent in college. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; confidence intervals, regression and correlation analysis. Not open for credit to students who have completed any statistics course numbered higher than 13, except for course 102. GE credit: SciEng.

#### \*13AT. Self-Paced Modular Instruction in Elementary Statistics

 (4) I, II. Wiggins

Autotutorial—4 hours. Prerequisite: two years of high school algebra, no prior knowledge of computers assumed. Computer tutorial. Corresponds to course 13. Students working at computer solve randomly chosen problems until they qualify to take examinations. Computer-timed examinations present a fixed number of problems for solution. Exams may be repeated.

#### 32. Basic Statistical Analysis Through Computers

 (3) II, III. The Staff

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.

**90X. Seminar** (1-2) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

##### 100. Applied Statistics for Biological Sciences

 (4) I, II, III. The Staff

Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 16B or the equivalent. Probability computation/modeling, 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 or 32. Not open for credit to students who have taken course 102. GE credit SciEng.

##### 102. Introduction to Probability Modeling and Statistical Inference

 (4) I, III. The Staff

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.

##### 103. Applied Statistics for Business and Economics

 (4) I, II, III. The Staff

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.

##### \*104. Applied Statistical Methods:

**Nonparametric Statistics** (3) II. The Staff  
Lecture—3 hours. 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.

##### 106. Applied Statistical Methods: Analysis of Variance

 (4) I, II. The Staff

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.

##### 108. Applied Statistical Methods: Regression Analysis

 (4) I, II, III. The Staff

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.

##### 120. Probability and Random Variables for Engineers

 (4) I, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Basic concepts of probability theory with applications to electrical engineering, discrete and continuous random variables, conditional probability, combinatorics, bivariate distributions, transformation of random variables, law of large numbers, central limit theorem, and approximations. No credit for students who have taken course 131A or Civil and Environmental Engineering 114. GE credit: SciEng.

##### 130A. Mathematical Statistics: Brief Course

 (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B. 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.

##### 130B. Mathematical Statistics: Brief Course

 (4) II. The Staff

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.

##### 131A. Introduction to Probability Theory

 (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. 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 taken Mathematics 131.

##### 131B-131C. Introduction to Mathematical Statistics

 (4-4) II-III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A, or Mathematics 22A and 131. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory, and nonparametric inference.

##### 133. Mathematical Statistics for Economists

 (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and Mathematics 16B, or the equivalents; no credit will be given to students majoring in Statis-

tics. 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).

**135. Multivariate Data Analysis** (4) III. The Staff  
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.

**137. Applied Time Series Analysis** (3) III. The Staff  
Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Auto- and cross-correlation, spectral analysis, coherence, transfer relations, linear filters, seasonal adjustment, mean square regression, autoregressive moving average models, forecasting, Box-Jenkins methods, spectral analysis of variance, and signal detection and discrimination methods.

**138. Analysis of Categorical Data** (4) I. The Staff  
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.

**\*140. Introduction to Biostatistics I** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B or 133. Randomized studies, observational studies; logistic regression, Poisson regression, survival analysis, censoring, proportional hazards, exponential and Weibull models, log-linear models, statistical genetics. Not open for credit to students who have taken course 140B.

**141. Statistical Computing** (3) II. The Staff  
Lecture—3 hours. Prerequisite: course 130A or 131A, and one of courses 13, 32, 100, 102, or the equivalent, and experience in computer programming; course 130B or 131B recommended. Use of computers in statistics. Numerical foundations of statistical procedures. Computation of probabilities and quantiles. Random numbers. Monte Carlo method and bootstrap. Methods for parametric statistical models. Graphical methods and exploratory data analysis.

**\*142. Reliability** (3) III. The Staff  
Lecture—3 hours. 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** (3) I. The Staff  
Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in alternate years. GE credit: SciEng.

**\*145. Bayesian Statistical Inference** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 130A-130B or 131A-131B-131C or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision theory, estimation, testing, prediction, empirical Bayes methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, hierarchical Bayesian analysis, applications. Offered in alternate years.

**190X. Seminar** (1-2) I, II, III. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
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) I-II. The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**\*205. Statistical Methods for Research** (3) III. The Staff  
Lecture—3 hours. Prerequisite: course 106 or Agricultural Science and Management 150, or the equivalent. Topics in experimental design include: Latin squares, Youden squares, balanced and partially balanced incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

**\*222. Biostatistics: Survival Analysis** (4) III. The Staff  
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor. Incomplete data; life tables; nonparametric methods; parametric models; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. Offered in alternate years.

**223. Biostatistics: Generalized Linear Models** (4) II. The Staff  
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response relations; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. Offered in alternate years.

**224. Biostatistics: Clinical Trials and Advanced Topics** (4) III. The Staff  
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 223 or consent of instructor. Clinical trials; sequential design; covariate adjustment; meta-analysis; applications of generalized linear models; longitudinal studies; random effects models; advanced topics. Offered in alternate years.

**228. Statistical Quality Control and Productivity Improvement** (3) II. The Staff  
Lecture—3 hours. Prerequisite: Management 210A, 210B or Statistics 106. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability and graphical tools. (Same course as Management 228.)

**231A-231B-231C. Mathematical Statistics** (4-4-4) I-II-III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C and Mathematics 127A-127B or the equivalent. Distribution theory, decision theoretic methods, estimation and hypotheses testing, multivariate techniques, large sample theory.

**232A-232B. Linear Model Theory** (4-4) I-II. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

**\*233. Design of Experiments** (3) II. The Staff  
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Offered in alternate years.

**235A-235B-235C. Probability Theory** (3-3-3) I, II, III. The Staff  
Lecture—3 hours. Prerequisite: Mathematics 127C and courses 131A-131B or the equivalent. Measure theoretic foundations, abstract integration, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

**\*237A. Time Series Analysis: Foundations** (3) I. The Staff  
Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in alternate years.

**\*237B. Time Series Analysis: Statistical Inference** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 131B-131C and 237A. Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination filtering, spectral analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in alternate years.

**238. Theory of Multivariate Analysis** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 135 and 231C. Random vectors and matrices, characteristic functions; multivariate normal; multiple and canonical correlation; Cochran's Theorem; multivariate GLM; growth curves; Wishart distribution; likelihood ratio and union-intersection tests; simultaneous inference; spatial linear models; projection pursuit; Bayesian multivariate methods; Stein and shrinkage estimators. Offered in alternate years.

**\*240A-240B. Nonparametric Inference** (3-3) II-III. The Staff  
Lecture—3 hours. Prerequisite: course 231C; courses 235A-235B-235C recommended. Comprehensive two-quarter sequence on 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.

**\*241. Asymptotic Theory of Statistics** (3) III. The Staff  
Lecture—3 hours. Prerequisite: course 231C; courses 235A, 235B, 235C recommended. Topics in asymptotic theory of statistics chosen from: weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Offered in alternate years.

**250. Advanced Data Analysis** (4) I. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 141, 232A and either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, incomplete data analysis, diagnostics, non-standard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in alternate years.

**\*251. Topics in Advanced Theory of Statistics** (3) II. The Staff  
Lecture—3 hours. Prerequisite: course 231C. Bayesian, regression, sequential and survival analysis;

bootstrap and reliability theory; change-point problems; empirical and spatial processes; asymptotic inference under dependence; asymptotic theory in linear, parametric and semiparametric models. Offered in alternate years.

**280. Orientation to Statistical Research (2) III.** The Staff  
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. (S/U grading only.)

**290. Seminar in Statistics (1-6) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

**292. Graduate Group in Statistics Seminar (1-2) III.** The Staff  
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.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Individual Study (1-12) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**299D. Dissertation Research (1-12) I, II, III.** The Staff  
Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only.)

**Professional Course**

**390. Methods of Teaching Statistics (2) I.** The Staff (Chairperson in charge)  
Lecture/discussion—2 hours; workshop—1 hour. Prerequisite: graduate standing. Training in teaching methodology at the undergraduate level. Emphasis is on practical training exercises which are used to evaluate skills and improve these skills. Lecture exercises will be videotaped and critiqued. (S/U grading only.)

**Professional Course**

**401. Methods in Statistical Consulting (3) I.** The Staff  
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: graduate standing in Statistics. Introduction to consulting; in-class consulting as a group; individual or team consulting under supervision. May be repeated for credit. (S/U grading only.)

**Statistics (A Graduate Group)**

George G. Roussas, Ph.D., Chairperson of the Group  
Group Office, 380 Kerr Hall (530-752-2362)  
World Wide Web: <http://www-stat.ucdavis.edu>

**Faculty.** The Group has 45 faculty members from almost all colleges, schools, and divisions, including 16 from the Intercollege Division of Statistics.

**Graduate Study.** The Graduate Group 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. A Ph.D.

program with an emphasis in biostatistics is also offered and overseen by the Biostatistics Affinity Group, a subgroup of the Graduate Group in Statistics. For detailed information contact the Chairperson of the Group or the Graduate Adviser.

**Preparation.** 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.** W.O. Johnson, fall; J.-L. Wang, winter and spring.

**Subject A**

**See University Requirements (Undergraduate Education chapter)**

**Surgery**

**See Surgery (Medicine, School of); and Surgical and Radiological Sciences (Veterinary Medicine)**

**Surgical and Radiological Sciences**

(School of Veterinary Medicine)  
Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department  
Department Office, 2112 Tupper Hall (530-752-3599)  
World Wide Web: <http://www.vsr.vetmed.ucdavis.edu/vsr/default.html>

**Faculty**

- Cleta S. Bailey, D.V.M., Ph.D., Professor
- Nedim C. Buyukmihci, V.M.D., Professor
- Larry D. Galuppo, D.V.M., Assistant Professor
- Clare R. Gregory, D.V.M., Professor
- Steve C. Haskins, D.V.M., M.S., Professor
- Susan V. Hildebrand, D.V.M., Professor
- William J. Hornof, D.V.M., M.S., Professor
- Janet E. Ilkiw, B.V.Sc., Ph.D., Associate Professor
- James H. Jones, D.V.M., Ph.D., Professor
- Philip D. Koblik, D.V.M., M.S., Professor
- Richard A. Le Couteur, B.V.Sc., Ph.D., Professor
- Melinda H. MacDonald, D.V.M., Ph.D., Assistant Professor
- Bruce R. Madewell, V.M.D., M.S., Professor
- Margaret C. McEntee, D.V.M., Assistant Clinical Professor
- Thomas G. Nyland, D.V.M., Professor
- Timothy R. O'Brien, D.V.M., Ph.D., Professor
- John R. Pascoe, B.V.Sc., Ph.D., Professor
- Peter J. Pascoe, B.V.Sc., Associate Professor
- Kurt Schulz, D.V.M., M.S., Assistant Professor
- Jack R. Snyder, D.V.M., Ph.D., Associate Professor
- Eugene P. Steffey, V.M.D., Ph.D., Professor
- Alain P. Théon, Dr. Med. Vet., Ph.D., Associate Professor
- Philip B. Vasseur, D.V.M., Professor
- Frank J. M. Verstraete, Dr. Med. Vet., B.V.Sc., M.Med. Vet., Assistant Professor

**Emeriti Faculty**

- Roy W. Bellhorn, D.V.M., M.S., Professor Emeritus
- Eugene M. Breznock, D.V.M., Ph.D., Professor Emeritus
- Robert M. Cello, D.V.M., Professor Emeritus

- Marvin Goldman, Ph.D., Professor Emeritus
- Ira M. Gourley, D.V.M., Ph.D., Professor Emeritus
- Terrell A. Holliday, D.V.M., Ph.D., Professor Emeritus
- Robert L. Leighton, V.M.D., Professor Emeritus
- Dennis M. Meagher, D.V.M., Ph.D., Professor Emeritus
- Joe P. Morgan, D.V.M., Vet. med. dr., Professor Emeritus
- Harold R. Parker, D.V.M., Ph.D., Professor Emeritus
- Gordon H. Theilen, D.V.M., Professor Emeritus
- John D. Wheat, D.V.M., Professor Emeritus
- Alida P. Wind, M.V.D., Lecturer Emeritus

**Affiliated Faculty**

- David D. Canton, D.V.M., Assistant Clinical Professor
- Carolyn Craig, D.V.M., Lecturer
- Carol Gillis, D.V.M., Ph.D., Lecturer
- Dennis V. Hacker, D.V.M., Assistant Clinical Professor
- Steven R. Hollingsworth, D.V.M., Lecturer
- Susan A. Kraegel, D.V.M., Lecturer
- Andrew Kyles, Lecturer
- George M. Peavy, D.V.M., Assistant Clinical Professor
- Valerie Samii, D.V.M., Lecturer
- Randall H. Scagliotti, D.V.M., Associate Clinical Professor
- Sam Silverman, D.V.M., Ph.D., Clinical Professor
- James Ticer, D.V.M., Ph.D., Associate Clinical Professor
- Melinda K. Van Vechten, D.V.M., Assistant Clinical Professor
- Leigh West-Hyde, D.V.M., Associate Clinical Professor
- Tom Yarbrough, D.V.M., Academic Fellow

**Courses in Surgical and Radiological Sciences (VSR)**

**Lower Division Course**

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge) (P/NP grading only.)

**Upper Division Course**

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses**

**230. Principles of Anesthesia and Surgery (2) II.** Steffey  
Lecture—2 hours. Prerequisite: graduate or professional student or consent of instructor. Presentation and integration of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student numbers. Offered in alternate years.

**230L. Principles of Anesthesia and Surgery (2) II.** Steffey  
Laboratory—4 hours. Prerequisite: course 230 concurrently. Laboratory to complement course 230. Limited enrollment. Offered in alternate years. (S/U grading only.)

**\*265A. Principles and Practice of Veterinary Radiation Oncology - A (1.5) I.** Theon  
Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465A.) (S/U grading only.)

**\*265B. Principles and Practice of Veterinary Radiation Oncology - B (1.5) II.** Theon  
Lecture—1 hour. Prerequisite: course 265A. Principles and practice of veterinary radiation therapy. The topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465B.) (S/U grading only.)

\*Course not offered this academic year.



**281. Comparative Vertebrate Exercise Physiology** (3) II. Jones

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate student status or consent of instructor. Fundamental mechanisms of vertebrate exercise: Metabolism and energetics, muscle function, locomotor mechanics and oxygen transport and utilization. In addition, mechanisms specific to vertebrate taxa will be considered. Strong emphasis on allometric effects of body size on all of these functions. Offered in alternate years.

**290. Clinical Neurology/Neuropathology Conference** (1) I, II, III. Cardinet, Higgins, LeCouteur

Seminar—1.5 hours. Prerequisite: third- or fourth-year standing in the School of Veterinary Medicine, Veterinary Medicine Teaching Hospital, or UCDCM resident or graduate student in appropriate discipline. Discussion and review of neural and muscular pathology of selected cases from the Veterinary Medicine Teaching Hospital. (S/U grading only.)

**291. Anesthesia/Critical Care Basic Science Conference** (1) I, II, III. The Staff (P. Pascoe in charge)

Discussion—1 hour. Prerequisite: postdoctoral, medical, or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (S/U grading only.)

**292. Advanced Veterinary Neurology/Neurosurgery** (2) I, II, III, IV. Bailey

Seminar—4 hours; weekly reading assignments; regular examinations. Prerequisite: House Officer in VMTH, UCDCM House Officers, graduate students in the School of Veterinary Medicine or School of Medicine, and 4th-year veterinary students with consent of instructor. Lectures/discussions/literature reviews of diagnosis and medical/surgical treatment of neurological diseases of animals. Relevant neurologic and neurosurgical topics from human medicine will be addressed. (S/U grading only.)

**293. Anesthesia/Critical Care Case Management Conference** (1) I, II, III. The Staff

(P. Pascoe in charge)  
Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Discussion of Veterinary Medical Teaching Hospital case material to illustrate specific medical problems and their preventive and corrective management. (S/U grading only.)

**\*294. Seminars in Veterinary Surgery** (1) I, II, III. Komtebedde

Seminar—1.5 hours every other week. Prerequisite: D.V.M. or equivalent degree and resident in specialty training or graduate student in related discipline. Discussion of selected topics pertaining to clinical academic veterinary surgery. Review of current principles and treatment modalities of veterinary surgery in large and small animals. (S/U grading only.)

**295. Veterinary Cancer Biology** (1) III. Madewell  
Seminar—10 sessions. Prerequisite: graduate students in Comparative Pathology and House Officers in the Veterinary Medicine Teaching Hospital. The biology of cancer, with specific reference to etiology and pathogenesis of tumors in domestic animals. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Steffey in charge)  
(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

**Professional Course****397T. Tutoring in Veterinary Surgical and Radiological Science** (1-5) I, II, III. The Staff

Lecture—1 hour; laboratory—3 hours; discussion—2 hours. For graduate or professional students who desire teaching experience, but are not teaching assistants. May be repeated for credit. (S/U grading only.)

**Professional Courses****404A. Small Animal Radiology** (1.9) II-III. Nyland

Lecture—15 hours; laboratory—4 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to interpretation of alternate imaging procedures and therapeutic radiology of small animals. (Deferred grading only, pending completion of sequence.)

**408. Special Procedures Rounds** (2) I, II, III. The Staff

Discussion—6 hours. Prerequisite: a DVM degree and consent of instructor. Approved for graduate degree credit. Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (S/U grading only.)

**409. Known Case Conference** (1.5) I, II, III. The Staff

Discussion/demonstration—1.5 hours. Prerequisite: DVM degree and consent of instructor. Approved for graduate degree credit. Film review of current VM Teaching Hospital proven cases. Intended for radiology residents and others with background in diagnostic radiology. May be repeated for credit. (S/U grading only.)

**410. Current Topics in Radiological Sciences** (1.5) I, II, III, IV. The Staff

Lecture—1.5 hours. Prerequisite: DVM degree or consent of instructor. Fundamentals of radiological sciences for radiology residents. Topics will include series of in-depth lectures covering the broad spectrum of veterinary radiology/radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (S/U grading only.)

**411. Small Animal Surgery** (1.5 per week) I, II, III. The Staff (Vasseur in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of pet animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

**412. Large Animal Surgery** (1.5 per week) I, II, III. The Staff (Pascoe in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of farm animal surgical patients in the hospital and outpatient clinic including physical examinations, presurgical work-up, assistance at operations, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

**413. Small Animal Dentistry** (2) I. Verstraete

Lecture—20 hours. 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 dental conditions, endodontics, prosthodontics, advanced periodontal therapy, oral medicine and advanced oral surgery. (S/U grading only.)

**414. Veterinary Anesthesiology** (1.5 per week) I, II, III. The Staff (Steffey in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for anesthetic care of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

**415. Lameness in Dogs** (1.3) III. Vasseur

Lecture—13 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Discussion of lameness examination will be followed by detailed

descriptions of the disorders that cause lameness in dogs and cats and methods to diagnose and treat them effectively. An important goal will be to distinguish those disorders that can be managed by the general practitioner from those that require referral to a specialist.

**415L. Lameness in Dogs** (0.5) III. Vasseur

Laboratory—2 three-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 415 concurrently. Hands-on experience in surgical manipulation and exposure of joints. (S/U grading only.)

**416. Equine Ultrasonology** (0.6) III. Gillis

Lecture—6 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.

**416L. Equine Ultrasonology Laboratory** (0.6) III. Gillis

Laboratory—6 sessions; discussion—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Familiarizes students with ultrasonographic diagnostic methodology and with ultrasonologic features of common diseases of the major equine organ systems.

**420. Small Animal Neurosurgery** (1) II. Bailey

Lecture—4 hours; laboratory—16 hours. Prerequisite: VMTH Neurology/Neurosurgery resident, VMTH Surgery resident or consent of instructor. Indications and techniques of selected small animal neurosurgical procedures. (S/U grading only.)

**422. Veterinary Ophthalmology** (0.75–1.5 per week) I, II, III. Buyukmihci

Laboratory—25-50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for the care of animals in the hospital and out-patient clinic including history taking, ophthalmologic examinations, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (S/U grading only.)

**423. Small Animal Ophthalmology** (2) III. Hollingsworth

Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnosis and treatment of commonly encountered eye diseases of small animals and nondomestic animals.

**423L. Small Companion Animal Ophthalmology Laboratory** (0.3) III. Hollingsworth

Laboratory—2 four-hour sessions. Prerequisite: course 422 or the equivalent and concurrent enrollment in course 423. Approved for graduate degree credit. Ocular surgical laboratory. Several surgical procedures involving the lids and conjunctiva, as well as enucleation, will be performed at each session. (S/U grading only.)

**424. Case Studies in Veterinary Oncology** (1) II. Madewell

Lecture—five 2-hour sessions. Prerequisite: second-year student of Veterinary Medicine elective course offering. By use of clinical case material, the student will be introduced to the Internal Medicine Subspecialty of Oncology. Course will highlight clinical considerations, but will also serve to introduce basic tenets of tumor biology. (S/U grading only.)

**460. Emergency and Critical Patient Care** (2) III. Haskins

Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.

**461. Small Animal Orthopedic Surgery** (1.6) II. Schulz

Lecture—16 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Management of common fractures, luxations and other injuries in dogs.

**461L. Small Animal Orthopedic Surgery** (0.5) II. Schulz

Laboratory—3 three-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 461 concurrently. Hands-on experience in application of external coaptation and basic principles of application of different types of fixation for fractures. (S/U grading only.)

**462. Radiographic and Ultrasonographic**

**Diagnosis: Small Animal** (1.1) III. Hornof  
Lecture/discussion—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine and course 404A. Small radiographic and ultrasonographic case studies discussed in small group setting. Limited enrollment. (S/U grading only.)

**463. Soft Tissue Surgical Diseases** (2) III.

Gregory  
Lecture—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.

**463L. Soft Tissue Surgical Diseases**

**Laboratory** (0.9) III. Gregory  
Laboratory—9 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 463 concurrently. Priority given to Small Animal Track students. Laboratory course complementing course 463. Three laboratories in applied surgical anatomy and physiology and six in operative surgical exercises which cover common emergency surgical procedures. (S/U grading only.)

**465A. Principles and Practice of Veterinary**

**Radiation Oncology - A** (1.5) II. Theon  
Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265A.) (S/U grading only.)

**465B. Principles and Practice of Veterinary**

**Radiation Oncology - B** (1.5) III. Theon  
Lecture—1 hour. Prerequisite: course 465A. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biological effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265B.) (S/U grading only.)

**466. Mixed-Large Animal Anesthesiology** (1.5)

II. Hildebrand  
Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Applied clinical anesthesiology for junior veterinary students. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, large non-domestic species, cats and dogs. (S/U grading only.)

**467. Small Animal Anesthesiology** (1.5) II. Ilkiw  
Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Presentation of material which is basic to safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

**468. Equine Lameness and Radiology** (4) III.

O'Brien  
Lecture—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of conditions that cause lameness in the equine will be emphasized. Methods used in large-animal radiography will be illustrated and latest technique for treating equine lameness will be discussed. Anatomy and pathology of some areas of the musculoskeletal system will also be presented.

**468L. Equine Lameness and Radiology** (1) III.

O'Brien  
Laboratory—10 three-hour sessions. Prerequisite: course 468 (concurrently). Priority enrollment for stu-

dents in equine track; others with consent of instructor. Limited enrollment.

**469. Equine Surgery** (3) III. Pascoe

Lecture—30 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Provides junior veterinary students with an understanding of those diseases of the soft tissues of the horse that can be managed surgically.

**469L. Equine Surgery Laboratory** (1.4) II.

Yarbrough  
Laboratory—8 sessions; discussion—6 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Successful completion of Veterinary Medicine 407 and concurrent enrollment in Veterinary Medicine 407L. (S/U grading only.)

**485. Equine Exercise Physiology and Sports Medicine** (1) II. Jones

Lecture—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Physiologic basis of equine athletic performance. This includes metabolism, muscle function, cardiopulmonary transport, locomotor mechanics as well as major disease processes associated with racing, e.g., orthopedic injuries. (S/U grading only.)

**492. Large Animal Grand Rounds** (0.5) I, II, III.

The Staff (Pascoe in charge)  
Discussion—1 hour. Prerequisite: professional standing; House Officer in Veterinary Medical Teaching Hospital or consent of instructor. House Officers take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. (S/U grading only.)

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## Textile Arts and Costume Design

See Design

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## Textile Science

See Fiber and Polymer Science

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## Textiles (A Graduate Group)

You-Lo Hsieh, Ph.D., Chairperson of the Group

Group Office, 129 Everson Hall (530-752-6650)

World Wide Web: <http://wdsroot.ucdavis.edu/caes/textiles/default.html>

**Faculty.** The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

**Graduate Study.** The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program can emphasize either the physical or 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 Adviser.** Y.-L. Hsieh (Textiles and Clothing).

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## Textiles and Clothing

(College of Agricultural and Environmental Sciences)

Margaret H. Rucker, Ph.D., Chairperson of the Division

Division Office, 129 Everson Hall (530-752-6650)

World Wide Web: <http://wdsroot.ucdavis.edu/caes/textiles/default.html>

**Faculty**

You-Lo Hsieh, Ph.D., Professor  
Stephen Jett, Ph.D., Professor  
Susan B. Kaiser, Ph.D., Professor  
Ning Pan, Ph.D., Associate Professor  
Margaret H. Rucker, Ph.D., Professor  
Gang Sun, Ph.D., Assistant Professor

**Emeriti Faculty**

Mary Ann Morris, Ph.D., Professor Emeritus  
Howard L. Needles, Ph.D., Professor Emeritus  
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

**Affiliated Faculty**

Ken Alger, M.S., Lecturer  
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.)

**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:**

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

**English Composition Requirement** .....4-12

See College Requirement .....0-8

Rhetoric 1 .....4

**Preparatory Subject Matter** .....39-41

Computer science (Agricultural Systems and Environment 21, Computer Science Engineering 15 or 30) .....3-4

|                                                                                                                                        |     |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Economic principles (Economics 1A-1B) 10                                                                                               |     |
| Art history, cultural anthropology or science and society (Anthropology 2, Science and Society 1, Art History 1A, 1B, 1C, or 1D) ..... | 4   |
| Physics (Physics 10 or Physics 1A) .....                                                                                               | 3-4 |
| Psychology (Psychology 1) .....                                                                                                        | 4   |
| Sociology (Sociology 2) .....                                                                                                          | 4   |
| Statistics (Statistics 13) .....                                                                                                       | 4   |
| Textiles and Clothing (Textiles and Clothing 6, 7, 8) .....                                                                            | 11  |

**Breadth/General Education**.....6-24  
Satisfaction of General Education requirement

**Select one of the following two options:**

**Marketing/Economics Option**

**Option-Specific Preparatory Subject Matter ...18**

|                                         |     |
|-----------------------------------------|-----|
| Accounting (Management 11A-11B) .....   | 8   |
| Chemistry (Chemistry 10 or 2A) .....    | 4-5 |
| Mathematics (Mathematics 16A-16B) ..... | 6   |

**Depth Subject Matter**.....57-58

|                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------|-----|
| Agricultural economics (Agricultural and Resource Economics 100A-100B, 106, 136) .....                                                | 16  |
| Statistics (Statistics 103) .....                                                                                                     | 4   |
| Psychology or Consumer Science (Psychology 145 or 183, or Consumer Science 100) .....                                                 | 3-4 |
| Textiles and clothing (Fiber and Polymer Science 110, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174) ..... | 31  |

**Restricted Electives**.....12

Courses selected from the following: Agricultural and Resource Economics 18, 112, 141M, 142, 155, 157, 171A, 171B, Anthropology 122, 126, Consumer Science 100, Design 77A, 77B, 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 145, 183, 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.

**Unrestricted Electives**.....15-44

**Textile Science Option**

**Option-Specific Preparatory Subject Matter ...19**

|                                            |    |
|--------------------------------------------|----|
| Chemistry (Chemistry 2A, 2B, 8A, 8B) ..... | 16 |
| Mathematics (Mathematics 16A) .....        | 3  |

**Depth Subject Matter**.....52-53

|                                                                                                                                                  |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Agricultural economics (Agricultural and Resource Economics 112, 113) .....                                                                      | 8   |
| Design (Design 143) .....                                                                                                                        | 4   |
| Psychology or Consumer Science (Psychology 145 or 183, or Consumer Science 100) .....                                                            | 3-4 |
| Textiles and clothing (Fiber and Polymer Science 100, 161, 161L, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174) ..... | 34  |

**Restricted Electives**.....16

Courses selected from the following: Agricultural and Resource Economics 18, 141, 141M, 142, 155, 171A, 171B, Agricultural Systems and Environment 120, Chemistry 1C, 128A, 128B, 128C, Communication 42, 130, 136, 140, Community and Regional Development 162, Consumer Science 100, Design 77A, 77B, 142A, 142B, 160A, 160B, 160C, 170A, 170B, 170C, Economics 11A, 11B, 100, 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, Mathematics 16A, 16B, 16C, Psychology 145, 183, 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.

**Unrestricted Electives**.....17-46

**Total Units for the Degree**.....180  
(Marketing/Economics or Textile Science Option)

**Major Adviser.** S. Kaiser.

**Advising Center** for the major is located in 129 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 129 Everson Hall.

UNITS

**Textiles and Clothing**.....18

|                                                                                                                                                   |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Textiles and Clothing 6, 7, or 8 .....                                                                                                            | 3-4   |
| Courses selected from Fiber and Polymer Science 100, 110, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174 ..... | 14-15 |

**Minor Adviser.** S. Kaiser.

**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.*

**Lower Division Courses**

**6. Introduction to Textiles** (4) I. Sun  
Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. GE credit: SciEng.

**7. Style and Cultural Studies** (3) II. Kaiser  
Lecture/discussion—3 hours. 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.

**8. The Textile and Apparel Industries** (4) I. Rucker  
Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SocSci, Div.

**92. Internship in Textiles and Clothing** (1-12) I, II, III. The Staff (Rucker in charge)  
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) I, II, III. The Staff (Rucker in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

**Upper Division Courses**

**107. Social and Psychological Aspects of Clothing** (4) I. Kaiser  
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.

**162. Textile Fabrics** (3) II. Pan  
Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SciEng.

**162L. Textile Fabrics Laboratory** (1) II. Pan  
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.

**163. Textile Coloration and Finishing** (3) III. Sun  
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.

**163L. Textile Coloration and Finishing Laboratory** (1) III. Sun  
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.

**164. Principles of Apparel Production** (3) III. The Staff  
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.

**\*165. Textile Processes** (3) I. Pan  
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) I. Hsieh, Pan  
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.

**173. Principles of Fashion Marketing** (3) II. Rucker  
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.

**\*174. Introduction to World Trade in Textiles and Clothing** (2) II. Rucker  
Lecture—2 hours. 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. Offered in alternate years. GE credit: SocSci, Div.

**180A-180B. Introduction to Research in Textiles** (2-2) I, II, III. The Staff (Rucker in charge)  
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.)

**192. Internship in Textiles and Clothing** (1-12) I, II, III. The Staff (Rucker in charge)  
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.)



**197T. Tutoring in Textiles and Clothing** (1-5) I, II, III. The Staff (Rucker in charge)  
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) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

### Graduate Courses

**\*230. Behavioral Science Concepts in Textiles** (3) I. Kaiser

Lecture—3 hours. Prerequisite: course 107, upper division or graduate course in statistics (e.g., Agricultural Systems and Environment 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.

**250A-F. Special Topics in Polymer and Fiber Science** (3) I, II, III. Hsieh/Pan  
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.)

**290. Seminar** (1) I, II. The Staff  
Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)

**290C. Research Conference** (1) I, II, III. The Staff (Rucker in charge)  
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.)

**293. Recent Advances in Textiles** (3) II. The Staff  
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.

**298. Group Study** (1-5) I, II, III. The Staff (Rucker in charge)

**299. Research** (1-12) I, II, III. The Staff (Rucker in charge)  
(S/U grading only.)

### Professional Course

**396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Transportation Technology and Policy (A Graduate Group)

Patricia L. Mokhtarian, Ph.D., Chairperson of the Group

Group Office, 2028 Academic Surge (530-752-6548)

World Wide Web: <http://www.engr.ucdavis.edu/~its>

**Faculty.** The Group includes faculty from eight academic departments and programs and the 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 and one course each in 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. The core courses (15 units) are required of all students in both degrees and both tracks. Master’s degree students are required to take 21 units of additional course work (for a total of 36 units), at least 12 of which must be from the approved course list of their chosen track. M.S. Plan I students may replace up to 6 units of regular course work with research (course 299) units. Ph.D. students are required to take 54 units; they should include the 15 units of core courses, at least 27 units from the approved course list of their chosen track, and at least 9 units from the approved course list of the other track. At least two thirds of all credits must be at the graduate level.

**Graduate Adviser:** P.L. Mokhtarian.

### Curriculum

**Core Courses.** All students are required to take five core courses as shown below (15 units). In addition, students are expected to register for Transportation Technology and Policy 298 (or the approved equivalent in another department), a one-unit seminar course, each quarter it is offered. Transportation Technology and Policy 298 or the equivalent units will not count toward the required totals. Ph.D. students are also required to take Civil and Environmental Engineering 252.

Management 250 or 251

Civil and Environmental Engineering 251 and 256, and either 263 or 268

Civil and Environmental Engineering 255 or Environmental Science and Policy 278

**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 176

Civil and Environmental Engineering 153, 160, 252, 253, 254, 255, 258, 262

Civil and Environmental Engineering/Environmental Science and Policy 163

Ecology 290

Environmental Science and Policy 168A, 168B, 212A, 212B

Management 203B, 216, 249, 283, 285

Statistics 205

**Technology Courses.** Approved courses in this area include the following (additional courses may be added upon approval by the Chairperson):

Atmospheric Science 116

Civil and Environmental Engineering 149, 161, 162, 242, 289

Computer Science Engineering 272

Management 252

Mechanical Engineering 134, 161, 163, 188, 217, 226, 234, 236

## Courses in Transportation Technology and Policy (TTP)

### Graduate Courses

**289. Selected Topics in Transportation Technology and Policy** (1-5) I, II, III. Chairperson in Charge

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.

**290C. Graduate Research Group Conference**

(1) I, II, III. Chairperson in Charge

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in transportation. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. Chairperson in Charge

Discussion—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. Chairperson in Charge

Discussion—1-12 hours. Prerequisite: consent of instructor. (S/U grading only.)

### Professional Course

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## UC Davis Washington Center

Bruce W. Jentleson, Director and Professor

UC Davis Washington Center,  
2301 M Street, NW, 5th Floor,  
Washington, D.C. 20037  
(202-296-8221)

Information:

UC Davis Washington Center On-Campus Office  
Internship and Career Center  
South Hall, 2nd Floor, 530-752-7260

World Wide Web: <http://ps.ucdavis.edu/wdc>

The UC Davis Washington Center began operations in the 1990-91 academic year. It 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 satellite interactive “tele-courses.”

## Undergraduate Academic Internship Program

The UC Davis Washington Center undergraduate program is open to students from all majors at UC Davis who have completed 84 units towards graduation. Students earn 12-16 units of academic credit, continue to be registered as full-time students, and fulfill university residency requirements. A GPA of approximately 3.0 is recommended for admission. Applicants also are evaluated based on a written statement, letters of recommendation and personal interviews.

The **Undergraduate Program** runs fall and spring quarters, on a 12-13 week "extended quarter" basis. It has two principal components:

- **Internships/Research Projects (9 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. Drawing on the internship experience, each student develops an independent research project, under the supervision of a member of the faculty.
- **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, other social sciences, history, and the arts and humanities. In addition to regular instruction, seminars often include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences.

Courses are taught by UC Davis faculty in residence, faculty from the UCLA, UC Santa Barbara, UC Santa Cruz, UC San Diego, and UC Berkeley Washington 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 Center, including the University of California President's Washington Scholarship Program, and the Joyce and Norman Weil Scholarships.

Students live in university-arranged housing, convenient to public transportation. Arrangements also 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.

The UC Davis Washington Center also operates a **Summer Program**. The Summer Program has a credit or non-credit option. The credit option allows students to earn 5 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 of \$200. Both options allow students to participate in many educational, cultural, historical and social activities. Some financial assistance is provided but more limited than for the academic year programs.

The Washington Center also has positions during the academic year for graduate students as **Graduate Fellows** (combination of a predoctoral research fellowship and a teaching assistantship) and **Graduate Summer Internships**.

In partnership with faculty on campus, the Washington Center also conducts **satellite interactive "telecourses"** in which students on the Davis campus participate in interviews and seminars with federal government officials and other experts from the nation's capital.

The Washington Center also houses one of the computer laboratories that, along with the main one on campus in the Political Science Department, comprise the **UC Davis Sun Technology and Research Excellence Center (Sun TREC)**. Made possible through a major gift from Sun Microsystems Computer

Company, Sun TREC UC Davis is developing innovative technology-based projects involving faculty, students, the private sector and policy makers at the federal, state, and local levels on key public policy issues.

## Urban Planning

**See Community and Regional Development; Engineering: Civil and Environmental; Environmental Horticulture and Urban Forestry; Environmental Policy Analysis and Planning; and Environmental Science and Policy**

## Urology

**See Medicine, School of**

## Vegetable Crops

(College of Agricultural and Environmental Sciences)

Kent J. Bradford, Ph.D., Chairperson of the Department

Department Office, 148 Asmundson Hall  
(530-752-0516)

World Wide Web: <http://veghome.ucdavis.edu>

### Faculty

Steffen Abel, Ph.D., Assistant Professor  
Lars W. Anderson, Ph.D., Lecturer  
David E. Bayer, Ph.D., Professor  
Alan B. Bennett, Ph.D., Professor  
Arnold J. Bloom, Ph.D., Professor  
Kent J. Bradford, Ph.D., Professor  
Marita Cantwell, Ph.D., Lecturer  
Roger T. Chetelat, Ph.D., Lecturer  
Joseph M. DiTomaso, Ph.D., Lecturer  
Clyde L. Elmore, Ph.D., Lecturer  
Steven A. Fennimore, Ph.D., Lecturer  
Albert J. Fischer, Ph.D., Assistant Professor  
Timothy K. Hartz, Ph.D., Lecturer  
Louise E. Jackson, Ph.D., Associate Professor  
W. Thomas Lanini, Ph.D., Lecturer  
Muhammad Marrush, Ph.D., Lecturer  
Jeffrey P. Mitchell, Ph.D., Lecturer  
Richard W. Michelmore, Ph.D., Professor  
Donald J. Nevins, Ph.D., Professor  
Robert F. Norris, Ph.D., Associate Professor  
Carlos F. Quiros, Ph.D., Professor  
Dina St. Clair, Ph.D., Associate Professor  
Mikal E. Saltveit, Ph.D., Professor  
David F. Spencer, Ph.D., Lecturer  
Trevor V. Suslow, Ph.D., Lecturer  
Ronald E. Voss, Ph.D., Lecturer  
John I. Yoder, Ph.D., Professor

### Emeriti Faculty

James F. Harrington, Ph.D., Professor Emeritus  
Robert F. Kasmiere, Ph.D., Lecturer Emeritus  
James M. Lyons, Ph.D., Professor Emeritus  
Jim W. B. McHenry, Ph.D., Lecturer Emeritus  
Lawrence W. Mitich, Ph.D., Lecturer Emeritus  
Leonard L. Morris, Ph.D., Professor Emeritus  
Harlan K. Pratt, Ph.D., Professor Emeritus  
Lawrence Rappaport, Ph.D., Professor Emeritus  
Charles M. Rick, Ph.D., Professor Emeritus  
Vincent Rubatzky, Ph.D., Lecturer Emeritus  
William L. Sims, Ph.D., Lecturer Emeritus  
Paul G. Smith, Ph.D., Professor Emeritus  
Arthur R. Spurr, Ph.D., Professor Emeritus

Herman Timm, Ph.D., Lecturer Emeritus  
James E. Welch, Ph.D., Lecturer Emeritus  
Masatoshi Yamaguchi, Ph.D., Professor Emeritus  
Shang Fa Yang, Ph.D., Professor Emeritus

**Graduate Study.** A program of study is offered leading to the M.S. degree in Vegetable Crops (Horticulture). Information can be obtained from the graduate adviser. Also see the Graduate Studies chapter of this catalog.

**Graduate Adviser.** H. Timm.

**Related Courses.** Vegetable Crops faculty also teach the following courses that contribute to majors and graduate programs in Agricultural Systems and Environment, Biological Sciences, Genetics, and Plant Biology:

Agricultural Systems and Environment 2, 110C, 118, 195, Biological Sciences 1C, 101, Genetics 201D, 207L, 296, Plant Biology 1, 12, 154, 161A, 172, 172L, 176, 177, 188, 196, Plant Biology Graduate Group 201, 212, 214, 217, 218A, 223, 228, 293.

## Courses in Vegetable Crops (VCR)

*Questions pertaining to the following courses should be directed to the instructor or to the Vegetable Crops Office, 148 Asmundson Hall.*

### Lower Division Course

**92. Internship in Vegetable Crops (1-6) I, II, III.**

The Staff (Department Chairperson in charge)  
Internship—3-36 hours. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only.)

### Upper Division Courses

**192. Internship in Vegetable Crops (1-12) I, II, III.**

The Staff (Chairperson in charge)  
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only.)

**197T. Tutoring in Vegetable Crops (1-3) I, II, III.**

The Staff (Chairperson in charge)  
Laboratory/discussion—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**\*212. Postharvest Physiology of Vegetables (4) III.** Saltveit

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 112 or 172. Comparative physiology of harvested vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboratories stress concepts and research procedures. Offered in alternate years.

**216. Ecology and Agriculture (3) I.** Jackson  
Lecture/discussion—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 autecology, biotic interactions among crops and pests, and crops systems ecology. (Same course as Ecology 216.)

**220. Biotechnology and Genetics of Crop Improvement** (3) II. Michelmore

Lecture—3 hours. Prerequisite: Biological Sciences 101 or Plant Biology 152; Plant Biology 154 or consent of instructor. Integration of modern biotechnology and classical plant breeding including molecular markers, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, hybrid production, disease resistance, and novel plant products.

**220L. Biotechnology and Genetics of Crop Improvement Laboratory** (1) II. Michelmore  
Laboratory—3 hours. Prerequisite: course 220 concurrently. Projects in plant genetics and biotechnology: identification and analysis of molecular markers, generation and characterization of transgenic plants.

**221. Genetics and Cytogenetics of Vegetable Crops** (3) III. Quiros

Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the principal vegetables on a crop by crop basis. Current advances on the cytogenetic technology, sources of germplasm and applications to practical breeding problems.

**228. Plant Molecular Biology Laboratory** (5) II. Bennett, Harada (Botany)

Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics, and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Plant Biology 228.)

**290. Seminar** (1) I, II. The Staff

Discussion—1 hour. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)  
Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff

(Chairperson in charge)  
(S/U grading only.)

**Professional Course**

**300. Tutoring in Vegetable Crops** (1-3) I, II, III.

The Staff (Chairperson in charge)  
Tutoring—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (S/U grading only.)

**396. Teaching Assistant Training Practicum**

(1-4) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Ian Gardner, D.V.M., M.P.V.M., Ph.D., Director,  
Master's of Preventive Veterinary Medicine  
Program

Donald J. Klingborg, D.V.M., Assistant Dean—Public  
Programs; Director, Veterinary Extension  
School Office, Rooms 101–142 Surge IV  
(530-752-1360)

World Wide Web: <http://www.vetmed.ucdavis.edu>

**Courses in Veterinary Medicine (VMD)**

**Lower Division Course**

**92. Internship in Veterinary Science** (1-12) I, II, III, IV. Pascoe

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.)

**Upper Division Courses**

**170. Ethics of Animal Use** (4) III. Dundon

Lecture—3 hours; discussion—1 hour. Prerequisite: any basic course in composition or speech. Study of applied ethical methodology, tightly organized writing of critiques and policy statements in ethical use of animals. Learning respect for divergent views in professional and public treatment of animals through case histories and by discussion of consensus policies to protect animals and human values. GE credit: SocSci, Wrt.

**192. Internship in Veterinary Science** (1-12) I, II, III, IV. Pascoe

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.)

**Graduate Courses**

**298. Group Study** (1-5) I, II, III. The Staff

(S/U grading only.)

**299. Directed Independent Study** (1-12) I, II, III.

The Staff  
(S/U grading only.)

**Professional Courses**

**400. Informatics** (1) I. Pascoe

Discussion—2 hours; laboratory—eight 3-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Acquisition of elementary skills and proficiency in the use of microcomputing will be achieved through the "real time" use of microcomputers within the science laboratories of instruction. (S/U grading only.)

**401A. Normal Anatomy of the Canine Locomotor System** (2.8) I. Hyde

Lecture—10 sessions; laboratory—18 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy with comparison to other species of bones, joints, muscles, ligaments, tendons, nerves, and vessels of the vertebral column and limbs.

**401B. Normal Anatomy of the Canine Head** (1.4) II. Popper

Lecture—6 sessions; laboratory—8 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 head, including the eye and ear, with comparison to other species.

**402. Structure and Function of the Cardiorespiratory System** (4.2) II. Jones

Lecture—29 hours; laboratory—13 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Residents in Specialty Training or graduate students with consent of instructor. Integrated view of cardiovascular anatomy and physiology.

**402D. Structure and Function of the Urinary System and Body Fluids** (2.2) III. Lloyd

Lecture—15 sessions; laboratory—7 sessions. Prerequisite: first-year standing in veterinary curriculum or consent of instructor. 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.

**403A-403B. Physiological Chemistry** (3.6-2.8)

I-II. Hansen, Cortopassi  
Lecture—54 sessions; laboratory—4 sessions; discussion—6 sessions (total). Prerequisite: first-year standing in the School of Veterinary Medicine. Biochemical concepts used to analyze problems and evaluate metabolic relationships important in animal health and disease. Integrative approach, emphasizing the interrelationships among metabolic pathways and the signal transduction cascades that regulate them.

**405. Veterinary Parasitology** (3.6) III. Conrad, Boyce

Lecture—26 hours; laboratory—10 three-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides an understanding of the important biological and clinical aspects of parasites and the disease they cause in animals.

**406. Principles of Behavior** (0.7) I. Hart

Lecture—7 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Overview of animal behavior with relevance to veterinary medicine.

**407. Principles and Techniques of Operative Surgery and Anesthesia** (2.4) I. Gregory

Lecture—24 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to operative and anesthetic skills and foundation in the importance of regional anatomy in the planning and conduct of surgical practice.

**407L. Principles and Techniques of Operative Surgery Laboratory** (1.4) I-II. Gregory

Laboratory—14 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; course 426. Introduction to surgical anatomy, operative and anesthetic skills. (S/U grading only; deferred grading only pending completion of course.)

**408. Nutrition and Nutritional Diseases in Animals** (2.9) II. Morris

Lecture—27 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Principles of nutrition and their application to the solution of nutritional disorders of animals.

**409. Epidemiology** (1.7) III. Hird

Lecture—11 hours; discussion—6 hours. Prerequisite: first-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Introduction to epidemiology and its applications in veterinary medicine.

**410. Musculoskeletal Radiology** (1) II. The Staff

Lecture—6 sessions; discussion—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to radiographic interpretation as it relates to diagnosis and management of musculoskeletal system disorders in small and large animals. Lectures stress radiographic pattern recognition and include detailed descriptions of representative orthopaedic lesions. Discussions are case-based exercises where students apply knowledge gained in lectures.

**412. Fundamentals of Zoonoses** (1.1) III. Chomel

Lecture—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. Major zoonotic infections transmitted mainly by farm animals and pets. For each animal species and each infection, a short review of symptoms, diagnostic tests, epidemiology and control are presented. Specific lectures on regulatory medicine of major zoonoses: e.g., rabies, tuberculosis.

**413. Veterinary Food Safety** (1.3) III. Cliver

Lecture—10 sessions; discussion—3 sessions. Prerequisite: second-year standing in the School of Vet-

**Veterinary Medicine,  
School of**

Bennie I. Osburn, D.V.M., Ph.D., Dean of the School  
John R. Pascoe, B.V.Sc., Ph.D., Executive Associate  
Dean

Robert J. Hansen, Ph.D., Associate Dean—Student  
Programs

Dallas M. Hyde, Ph.D., Associate Dean—Research  
and Graduate Education Programs

Bradford P. Smith, D.V.M., Associate Dean—Clinical  
Programs; Director, Veterinary Medical  
Teaching Hospital

Mary M. Christopher, D.V.M., Ph.D., Assistant  
Dean—Academic Programs

James S. Cullor, D.V.M., Ph.D., Director, Veterinary  
Medicine Teaching and Research Center, Tulare

\*Course not offered this academic year.



erinary 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.

**414A. Principles of Veterinary Pharmacology and Toxicology** (2.4) I. Buckpitt

Lecture—19 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. Pharmacokinetics, pharmacodynamics and chemotherapy of bacterial, neoplastic, fungal and viral diseases.

**414B. Veterinary Pharmacology** (2.4) II. Vulliet  
Lecture—22 sessions; discussion—2 sessions. Prerequisite: second year standing in the School of Veterinary Medicine; passing grade in course 414A. Basic principles for the use of drugs affecting the autonomic and central nervous systems as well as compounds affecting the cardiovascular system.

**414C. Veterinary Toxicology** (1.9) III. Pessah  
Lecture—17 sessions; discussion—2 sessions. Prerequisite: second year standing in the School of Veterinary Medicine, passing grades in courses 414A and 414B. Toxicants of major importance in veterinary medicine. Basic principles and mechanism of action of toxicants.

**419. Virology** (2.7) I. Zee, Yilma

Lecture—19 hours; laboratory—8 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. 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.

**420. Immunology** (3.0) III. Gershwin

Lecture—20 hours; laboratory—10 three-hour 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.

**421. Principles of Neurosciences** (2.7) I. Gietzen

Lecture—22 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. An integrated study of normal neurobiology, neuroanatomy, and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.

**422. Veterinary Ophthalmology** (1.4) II. Buyukmihci

Lecture—13 sessions; laboratory—1 session. Prerequisite: third-year standing in the School of Veterinary Medicine. Basic information on how the eye is examined, how it interacts with the rest of the body and what can go wrong with the eye. Discussion of selected ocular diseases of various species.

**426. Principles of Veterinary Anesthesiology and Critical Patient Care** (1.7) III. Steffey

Lecture—15 hours; laboratory—2 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Offers basic principles of veterinary anesthesiology including techniques of monitoring and management of animals under anesthesia.

**427. Cell and Tissue Structure and Function** (3.3) I. Tablin

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.

**430. Principles of Radiology and Radiographic Anatomy** (3.3) I-II-III. Koblik

Lecture—25 sessions, laboratory—6 sessions, discussion—2 sessions (total for series). 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. Practical aspects of veterinary radiographic techniques. Normal radiographic anatomy of the skeleton, head, thorax and abdomen. (Deferred grading only, pending completion of three-quarter sequence.)

**431. Endocrinology and Metabolism** (2.3) III. Hansen

Lecture—22 sessions; laboratory—1 session. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic understanding of structure and normal physiological function of the endocrine glands, their hormones, and other factors that affect the regulation of metabolic processes.

**432. Structure and Function of the Gastrointestinal and Mammary Systems** (3) II. Hinton

Lecture—20 sessions; laboratory—10 sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Basic understanding and correlation of the structure and function of the gastrointestinal and mammary systems. Multiple species' differences examined.

**433. Veterinary Oncology** (1.2) II. Madewell

Lecture—12 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides veterinary students with a background to define the relationships between pathology, hematology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.

**435A-435B. Clinical Hematology and Biochemistry** (3.7-2.5) I-II. Zinkl, Christopher

Lecture—23 sessions/16 sessions (435A/435B); laboratory—11 sessions/5 sessions; discussion—3 sessions/4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Knowledge and understanding of normal form and function of the hemolymphatic, exfoliative cytologic, and clinical biochemical systems provide critical information which aids veterinarians in assessing physical status and in understanding the etiopathogenesis of disease.

**437A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communications** (0.8) I. Pascoe

Discussion—8 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the important responsibilities of veterinarians to society through their role as health care providers. (S/U grading only.)

**437B. Ethics and Issues in Veterinary Medicine** (0.8) II. Pascoe

Discussion—8 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Continued introduction to the important responsibilities of veterinarians to society through their role as health care providers. (S/U grading only.)

**438. Animal Handling** (1) III. East

Laboratory—9 three-hour sessions; discussion—1 two-hour session. Prerequisite: first-year standing in School of Veterinary Medicine. Introduction and practice of methods of animal handling and restraint and selected techniques of diagnostic examination and therapy, as well as recognition of animal breeds, breed characteristics and purpose in animal species of veterinary importance. (S/U grading only.)

**440. Veterinary Neurology** (2.7) I. Bailey

Lecture—21 hours; laboratory—6 three-hour sessions. Prerequisite: third year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Integrated study of the relationship between neuroanatomy, neurophysiology, neuropathology, and the clinical manifestations of the diagnosis of neuro-

logical diseases and the use of the various neurodiagnostic aids.

**444. Clinical Endocrinology** (1.5) II. Feldman

Lecture—12 sessions; discussion—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. A correlated review of common endocrinology disorders affecting the dog and cat.

**446. Reproduction** (4.2) II. Conley

Lecture—32 hours; laboratory—10 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Structure, function, pathologic, and clinical aspects of reproduction in animals (normal and abnormal).

**447. Basic Medicine of Domestic Animals** (4.7) III. Cowgill

Lecture—45 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches common to medical diseases of domestic animals. Preparation for advanced course work in medical diagnosis and therapeutics with specific species focus and orientation.

**451. Veterinary Bacteriology and Mycology** (4.9) I. Hirsh

Lecture—34 hours; laboratory—15 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. 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.

**452. General Pathology** (3.1) I. Mohr

Lecture—18 hours; laboratory—13 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. 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.

**456. Law and Ethics of the Veterinary Profession** (1.6) III. Wilson

Lecture—16 sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities. (S/U grading only.)

**459. Systemic Pathology** (5.8) II. MacLachlan

Lecture—42 sessions; laboratory—16 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. 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 on balance between damage and repair.

**460. Fundamentals of Clinical Orthopedics** (1) II. Schulz

Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Fundamental concepts of veterinary orthopedics, including mechanisms of bone healing, types of fractures, and principles of stabilization.

**470. Hospital Practices** (3.4) I, II, III. Smith in charge

Laboratory—34 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Clinical training in Veterinary Medicine. Assignments in the medical and surgical services and clinical diagnostic facilities of the Veterinary Medical Teaching Hospital. (S/U grading only; deferred grading only pending completion of three-term sequence.)

**471. Mixed Animal Practice Clinics** (3-15) I-II-III. Smith

Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgi-

## 434 Viticulture and Enology

cal services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on services relating to mixed animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the summer-fall sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 472. Small Animal Practice Clinics (3-15) I-II-III. Smith

Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on services relating to small animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 473. Large Animal Practice Clinics (2.5-15) I-II-III. Smith

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to large animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 474. Equine Practice Clinics (2.5-15) I-II-III. Smith

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 475. Food Animal Practice Clinics (2.5-15) I-II-III. Smith

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to food animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 476. Zoological Practice Clinics (2.5-15) I-II-III. Smith

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to zoological veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 477. Small Animal/Equine Practice Clinics (3-15) I, II, III. Smith

Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary

medicine. Student assignments in the medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital with emphasis on small and equine species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of three-term sequence.)

### 478. Small Animal/Food Animal Practice Clinic (2.5-15) I, II, III. Smith

Veterinary clinical practices—7.5-45 hours per week. Prerequisite: fourth year standing in the School of Veterinary Medicine. Clinical training in veterinary medicine. Students will have assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on small and food animal species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (S/U grading only; deferred grading only, pending completion of sequence.)

### 490A. Hospital Practices for Veterinary Students (2) I, II, III. Ling

Laboratory—60 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to procedures and knowledge integral to working in a veterinary clinical practice and the VMTH. (S/U grading only; deferred grading only, pending completion of sequence.)

### 490B. Hospital Practices for Veterinary Students (2) I, II, III. Smith, Ling

Laboratory—60 hours. Prerequisite: course 490A and first-year standing in the School of Veterinary Medicine. Introduction to procedures and knowledge integral to working in a veterinary clinical practice and the VMTH. (S/U grading only; deferred grading only, pending completion of sequence.)

**490C. Core Hospital Practices (2) I, II, III. Smith**  
Laboratory—13 sessions (60 hours). Prerequisite: third-year standing in the School of Veterinary Medicine and course 490B. Continuation of 490B. (S/U grading only; deferred grading only, pending completion of sequence.)

## Viticulture and Enology

(College of Agricultural and Environmental Sciences)

James A. Wolpert, Ph.D., Chairperson of the Department

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### Faculty

Douglas O. Adams, Ph.D., Associate Professor  
Linda F. Bisson, Ph.D., Professor  
David E. Block, Ph.D., Assistant Professor (*Viticulture and Enology, Chemical Engineering*)  
Roger B. Boulton, Ph.D., Professor (*Viticulture and Enology, Chemical Engineering*)  
Susan E. Ebeler, Ph.D., Assistant Professor  
Mark A. Matthews, Ph.D., Associate Professor  
Carole P. Meredith, Ph.D., Professor  
David A. Mills, Ph.D., Assistant Professor  
Ann C. Noble, Ph.D., Professor  
M. Andrew Walker, Ph.D., Associate Professor  
Andrew L. Waterhouse, Ph.D., Associate Professor  
Larry E. Williams, Ph.D., Professor

### Emeriti Faculty

Maynard A. Amerine, Ph.D., Professor Emeritus  
James A. Cook, Ph.D., Professor Emeritus  
Richard E. Kepner, Ph.D., Professor Emeritus  
W. Mark Kliewer, Ph.D., Professor Emeritus  
Ralph E. Kunkee, Ph.D., Professor Emeritus  
Lloyd A. Lider, Ph.D., Professor Emeritus  
Harold P. Olmo, Ph.D., Professor Emeritus

Cornelius S. Ough, D.Sc., Professor Emeritus  
Vernon L. Singleton, Ph.D., Professor Emeritus,  
*Academic Senate Distinguished Teaching Award*  
A. Dinsmoor Webb, Ph.D., Professor Emeritus

### Affiliated Faculty

Christian E. Butzke, Ph.D., Assistant Cooperative Extension Specialist  
L. Peter Christensen, M.S., Cooperative Extension Specialist  
Nick K. Dokoozlian, Ph.D., Lecturer, Assistant Cooperative Extension Specialist  
James A. Wolpert, Ph.D., Cooperative Extension Specialist

## 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.

**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 can 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. Successful completion of this major can also provide the basis for preparation for graduate study in such areas as food science, microbiology, agricultural chemistry and plant biology.

## B.S. Major Requirements

(For convenience in program planning, the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

**English Composition Requirement** .....0-8  
See College requirement .....0-8

**Breadth/General Education** .....24  
See General Education requirement

**Preparatory Subject Matter** .....41-51

Biology (Biological Sciences 1A, 1C) .....10

Chemistry (Chemistry 2A, 2B, 2C or 2AH, 2BH, 2CH) .....15

Computer Science (Agricultural Systems and Environment 21 or equivalent and advisor approval) .....0-3

Mathematics (Mathematics 16A, 16B or 21A, 21B) .....6-8

Organic Chemistry (Chemistry 8A, 8B) .....6

Physics (Physics 7A) .....4

Viticulture and Enology (Viticulture and Enology 2, 3 or equivalent and advisor approval) .....0-5

**Depth Subject Matter** .....50-51

Biochemistry (Biological Sciences 102, 103) .....6

Microbiology (Microbiology 102, 102L) .....6

Statistics (Agricultural Systems and Environment 120 or Statistics 106) .....4

Viticulture (Viticulture and Enology 101A, 101B, 101C, 110, 118 and, in consultation with the advisor, choose one of Viticulture and Enology 115, 116. If both are taken, one will count as a restricted elective in Area A.) .....14-15

Enology (Viticulture and Enology 123, 124, 125, 126, 128, 135) .....20

**Restricted Electives .....28**

In consultation with advisor, 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**

The following lower division courses NOT listed among the prerequisites for the major are required or recommended for one or more of the Restrictive electives in this area: Agricultural Systems and Environment 2, Biological Sciences 1B, Food Science and Technology 2, Geology 50, Plant Biology 10A.

Biological Sciences 101, Entomology 110, Hydrologic Science 110, 113, 117, 124, Molecular and Cellular Biology 126, Nematology 100, Plant Biology 111, 112, 142, 143, 154, 157, 158, 160, 171, 172, 172L, 176, Plant Pathology 120, 125, Soil Science 100, 102, 109, Viticulture and Enology 111, 111L, one of 115, 116 (whichever was not used for depth)

**B. Food Science and Microbiology Area**

The following lower division courses NOT listed among the prerequisites for the major are required or recommended for one or more of the Restrictive Electives in this area: Biological Sciences 1B, Physics 7B, 7C.

Biological Sciences 101, Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, Microbiology 130A, 130B, 130L, Viticulture and Enology 140, 190X. Viticulture and Enology 190X may be taken a maximum of twice for restrictive elective credit.

**C. Economics and Business Area**

Agricultural and Resource Economics 100A, 112, 113, 118A, 118B, 130, 140, 150, Economics 1A, 1B, Management 11A, 11B, Viticulture and Enology 111, 111L, 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, 51, Italian 4, 5, 8A, 8B, Spanish 8, 21, 22, 28, 31, 32, 33.

Courses taught in English will not count as restricted electives in this major. Italian 8A may not be repeated for restricted elective credit.

**E. Internship Area**

A maximum of 8 units of Viticulture and Enology 190, 192, 198, 199, 290 or 298 may be counted as restricted electives by prior arrangement with advisor. May be increased to 12 units in exceptional circumstances.

**Unrestricted Electives .....18-35****Total Units for the Degree.....180**

**Major Adviser.** C. Meredith

**Related Major Programs.** In addition to the Viticulture and Enology major, enology is a specialization under the Fermentation Science major, and viticulture is a specialization under the Agricultural Systems and Environment major.

**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, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Biology, Plant Pathology, and Soil Science.

**Courses in Viticulture and Enology (VEN)****Lower Division Courses**

**2. Introduction to Viticulture** (2) I. Williams  
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.

**3. Introduction to Winemaking** (3) I. Meredith; II. Waterhouse; III. Adams

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.

**3W. Introduction to Winemaking: Writing Experience** (1) I. Meredith; II. Waterhouse; III. Adams

Term paper/discussion—1 hour. Prerequisite: course 3 (concurrent enrollment recommended). Preparation of a term paper on a subject covered in course 3. Introduction to searching the wine and grape literature in Shields Library. Papers graded on research quality, composition and critical thinking. GE credit with concurrent enrollment in course 3: Wrt.

**90X. Lower Division Seminar** (2) II. Ebeler, Bisson, Waterhouse

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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses****101A. Viticultural Practices** (2) I. Walker

Discussion/laboratory—4 hours. Prerequisite: course 2. Provides the information required to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

**101B. Viticultural Practices** (2) II. Walker

Discussion/laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including pruning, propagation, weed identification and control, frost protection, and physical examination of soil profiles and root distribution patterns.

**101C. Viticultural Practices** (2) III. Walker

Discussion/laboratory—4 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.

**110. Grapevine Growth and Physiology** (3) II. Matthews

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.

**111. World Viticulture** (3) III. Meredith

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) III. Meredith

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. Not open for credit to students who have received credit for course 145. (P/NP grading only.)

**115. Raisin and Table Grape Production** (2) I. Williams

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. Offered in alternate years.

**116. Winegrape Production** (3) III. Matthews

Lecture—3 hours. Prerequisite: course 2. Covers principles underlying cultural practices associated with winegrape production, including establishing and planting, training, summer and winter pruning, canopy management, irrigation, mineral nutrition, weed control, frost protection, crop regulation, and harvesting.

**\*118. Grapevine Pests, Diseases and Disorders**

(3) I. Williams

Lecture—3 hours. Prerequisite: course 2. Describes the 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. Offered in alternate years.

**123. Analysis of Musts and Wines** (4) I. Ebeler

Lecture/laboratory—5 hours; term paper. Prerequisite: Chemistry 2C and 8B or the equivalent. Fundamental principles of analytical chemistry as they relate to specific analytical methods used in winemaking. Analyses of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biochemical methods. GE credit: Wrt.

**124. Wine Production** (4) I. Bisson

Lecture—2 hours; laboratory—3 hours; independent study—3 hours. Prerequisite: course 3 and Biological Sciences 102; course 123 (may be taken concurrently). Open to undergraduate students in Fermentation Science, Microbiology, Molecular and Cellular Biology, and Plant Science; and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the method of vinification required for each. GE credit: Wrt.

**125. Wine Types and Sensory Evaluation** (4) II. Noble

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124, Agricultural Systems and Environment 120, and consent of instructor. Restricted to juniors and seniors in Fermentation Science major; others by consent of instructor only. Principles of sensory evaluation are introduced and applied to wines. To investigate factors influencing wine flavor, data from sensory analysis of model solutions and wines are analyzed and interpreted in extensive weekly lab reports. GE credit: Wrt.

**126. Wine Processing** (4) II. Boulton

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 124. Principles of equilibria and rates of various physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes. GE credit: Wrt.

**128. Wine Microbiology** (4) III. Mills

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 123, 124; courses 125, 126, Microbiology 102, 102L recommended. Nature development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wines.



**129. Instrumental Analysis of Must and Wine**

(4) III. Waterhouse, Ebeler, Boulton  
Lecture—2 hours; laboratory/discussion—1 hour; laboratory—3 hours. Prerequisite: course 123 or Food Science and Technology 103 or consent of instructor. Theory and practice for analysis of musts and wine. Primary focus will be on capillary electrophoresis and high performance liquid chromatography with some attention to gas chromatography.

**130. Management, Marketing, and Economics of the California Wine Industry** (9) Summer.

The Staff (Chairperson in charge)

Lecture—24 hours; lecture/discussion—4 hours; fieldwork—8 hours. Prerequisite: course 124. Introduction to management, marketing and economics of wine in the United States with particular emphasis on California. Reviews market segmentation and explores alternative strategies for grape acquisition, production, brand development, distribution, and social policy formation. GE credit: Wrt.

**135. Wine Processing Equipment** (1) II. Boulton  
Lecture—1 hour; field trip. Prerequisite: courses 124, 126; Food Science and Technology 110A, 110B recommended. A course for undergraduates which provides a systematic description of unit operations and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and techniques of operation and to the performance of this equipment with grapes, juices, and wines.

**\*140. Distilled Beverage Technology** (3) III.

Boulton

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.

**181. Readings in Enology** (1) Matthews

Discussion—1 hour. Prerequisite: course 3. Critical evaluation of selected monographs in enology. Monographs are usually recent publications with a historical perspective. Discussion leadership rotates among students. (P/NP grading only.)

**186. Fermentation Science** (3) III. Block

Lecture—3 hours. Prerequisite: Microbiology 102, Biological Sciences 101. Basic principles of fermentation science and biotechnology with emphasis on industrial fermentation processes that generate useful products including fermented food and beverages, pharmaceuticals, fine chemicals, and other gene products. Offered in alternate years.

**190X. Winemaking Seminar** (1) III. The Staff  
Seminar—1 hour; discussion—1 hour; research paper. Prerequisite: course 3. Weekly seminar presented by outside speakers on a specific winemaking topic chosen for the quarter. Discussion follows with the speaker hosted by the faculty member in charge. May be repeated twice for credit. GE credit: Wrt.

**192. Internship** (1-12) I, II, III, summer. The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****210. Grape Development and Composition** (4)

III. Adams, Polito

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102, 103. The anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Offered in alternate years.

**216. Vineyard Establishment and Development**

(4) I. Dokoozlian

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 Science 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.

**219. Natural Products of Wine** (3) II. Waterhouse  
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.

**\*220. Secondary Nutrients, Chemistry** (2) II.

Waterhouse

Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 8B, Biological Sciences 102. Introduction to phytochemicals with possible health or nutritional effects, with a focus on chemical structure, reactivity and occurrence in foods, including phenolics, glucosylates, carotenoids and fiber. Students will give oral reports. Offered in alternate years.

**225. Advanced Sensory Analysis of Wines** (3) III. Noble

Lecture/discussion—2 hours; laboratory—4 hours. Prerequisite: courses 124 and 125 (or Food Science and Technology 107) and Agricultural Systems and Environment 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. Offered in alternate years.

**235. Winery Design and Economics** (5) II.

Boulton

Lecture—2 hours; discussion—1 hour; studio—6 hours. Prerequisite: courses 124, 135; Food Science and Technology 110A recommended. 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. Grading based on design project. Offered in alternate years.

**270. Critical Evaluation of Scientific Literature**

(1) I, II, III. Bisson

Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Students choose, present and lead discussion of recent research articles in a special topic area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.)

**290. Seminar** (1) II, III. Ebeler

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**290C. Advanced Research Conference** (1) I, II, III. Research Faculty

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.)

**291. Advances in Viticulture** (1) II. Matthews

Discussion—1 hour. Prerequisite: course 110 or 116. Critical evaluation of text and scientific literature on selected topics of current interest in the viticulture research or production communities. Students participate in the literature search, lead the discussion of selected journal articles and prepare a short written

evaluation of same. (S/U grading only.)

**\*292. Advances in Enology** (1) III. Waterhouse  
Discussion—1.5 hours (7-10 weeks). Prerequisite: courses 123, 124, 125, and 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with their current research interests. May be repeated for credit. (S/U grading only.)

**297T. Tutoring in Viticulture and Enology** (1-5)

I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff

(Chairperson in charge)

(S/U grading only.)

## 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** .....20

One or two courses from each of the following areas:

*Approaches*

Anthropology 123B, 131, Comparative Literature 157, Philosophy 115, 118, Physics137/Applied Science Engineering 137, Political Science 121, 123, 124,132, 176, Sociology 119, 157, Women's Studies 102

*Northern and Western Regions*

Geography 124, History 134A, 138C, 142, 143, 144, 145, 170B, 171B, 174B, Native American Studies 130B, Political Science 130, 131, 136

*Southern and Eastern Regions*

Anthropology 142, 143, 144, Economics 170, History 165, 191F, 194C, Native American Studies 120, Political Science 126, 134, 145, 149, 178

**Restriction:** No more than two courses from a single department may be offered in satisfaction of the minor requirements.

**Advising.** International Relations Program, 752-3063.

## Water Science

See Hydrologic Sciences; and Hydrology

# Wildlife, Fish and Conservation Biology

(College of Agricultural and Environmental Sciences)

Deborah L. Elliott-Fisk, Ph.D., Chairperson of the Department

Department Office, 1088 Academic Surge  
(530-752-6586)

World Wide Web: <http://www-wfb.ucdavis.edu>

## Faculty

Daniel W. Anderson, Ph.D., Professor  
Louis W. Botsford, Ph.D., Professor  
Tim Caro, Ph.D., Professor  
Joseph J. Cech, Jr., Ph.D., Professor  
Ronald E. Cole, B.S., Lecturer  
Chris Dewees, Ph.D., Lecturer  
John M. Eadie, Ph.D., Associate Professor  
Don C. Erman, Ph.D., Professor  
Nancy A. Erman, M.S., Lecturer  
Deborah L. Elliott-Fisk, Ph.D., Professor  
Douglas A. Kelt, Ph.D., Assistant Professor  
Peter B. Moyle, Ph.D., Professor  
Dirk Van Vuren, Ph.D., Associate Professor

## Emeriti Faculty

Walter E. Howard, Ph.D., Professor Emeritus  
Nadine K. Jacobsen, Ph.D., Professor Emerita  
Dale F. Lott, Ph.D., Professor Emeritus  
Rex E. Marsh, A.B., Lecturer Emeritus

## The Major Program

The wildlife, fish and conservation biology major deals with the relationships between the needs of people and the requirements of wildlife. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations.

**The Program.** Because of the diversity of problems in the field, the major emphasizes broad training in biological and physical sciences, with specialization in one of eight areas. The major is primarily for students interested in eventually becoming professionals in wildlife, fish and conservation biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable as a 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.** Positions now held by graduates in this major include wildlife, fisheries, management of problem vertebrates, and resource biologists and managers with local, state and federal agencies. Some graduates are biologists or consultants with private industries such as commercial fishing businesses, electrical utilities, sportsman's clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

## B.S. Major Requirements:

UNITS

|                                                                     |              |
|---------------------------------------------------------------------|--------------|
| <b>Written/Oral Expression</b> .....                                | <b>8</b>     |
| English 1 .....                                                     | 4            |
| Communication 1 .....                                               | 4            |
| Above requirements simultaneously satisfy the College requirements. |              |
| <b>Preparatory Subject Matter</b> .....                             | <b>50-56</b> |
| Biological sciences (Biological Sciences 1A, 1B, 1C) .....          | 15           |
| Chemistry (Chemistry 2A, 2B, 8A, 8B) .....                          | 16           |
| Computer science (Agricultural Systems and Environment 21) .....    | 3            |

Mathematics (Mathematics 16A, 16B) .....

Physics (Physics 1A, 1B or 7A, 7B, 7C) .....

Statistics (Statistics 100, 102 or Agricultural Systems and Environment 120) .....

## Breadth/General Education .....

Satisfaction of General Education requirement

## Depth Subject Matter .....

Students graduating with this major are required to attain at least a C average (2.0) in all courses taken at the university in depth subject matter.

Ecology (Environmental Science and Policy 100 or Evolution and Ecology 101) .....

Evolution (Evolution and Ecology 100) .....

Genetics (Biological Sciences 101) .....

Physiology (Neurobiology, Physiology and Behavior 101) .....

Vertebrate anatomy (Anatomy, Physiology and Cell Biology 100 or Evolution and Ecology 170) .....

Organismal core: Choose three lecture courses and two (laboratory) courses.

Wildlife, Fish, and Conservation Biology 110, (110L), 111, (111L), 120, (120L), or Evolution and Ecology 134, (134L) .....

12-13

Disciplinary core (Wildlife, Fish, and Conservation Biology 122, 140 or 141, and either 121 or 130) .....

11-12

Statistics: Choose one course (two recommended) from Statistics 104, 106 or 108 .....

3-8

Research methods (Wildlife, Fish, and Conservation Biology 100, or 101 and 101L, or 102 and 102L, or three laboratory courses from 110L, 111L, 120L, 123, 156, Evolution and Ecology 134L) .....

3-7

## Restricted Electives .....

Choose one from the eight Areas of Specialization shown below. Students must maintain a C average (2.0 GPA) and pass all course work in their chosen specialization.

9-34

**Areas of Specialization**

1. *Behavioral ecology:* Choose one course from each group:

a. Neurobiology, Physiology and Behavior 102 or Psychology 134;

b. Entomology 104, Environmental Science and Policy 101 or Anthropology 154A-154B;

c. Agricultural Systems and Environment 135, Environmental Science and Policy 128, or Wildlife, Fish, and Conservation Biology 151.

2. *Conservation biology:* Complete Wildlife, Fish, and Conservation Biology 154 and Environmental Horticulture 150. Choose one course from each group:

a. Entomology 147, Evolution and Ecology 117, 138, 147, or Wildlife, Fish and Conservation Biology 156;

b. Economics 123, Environmental Science and Policy 161, 166, Geography 161, or Wildlife, Fish, and Conservation Biology 157.

3. *Ecotoxicology and disease ecology:* Complete Wildlife, Fish, and Conservation Biology 153, Biological Sciences 102, 103. Choose two courses from a and one from b, or one from a and two from b:

a. Environmental Toxicology 101, 112A (112B recommended), 132, 138 or Hydrologic Science 21; and

b. Pathology, Microbiology and Immunology 101, Medical Microbiology 115 or 116.

4. *Fisheries biology:* Complete Wildlife, Fish, and Conservation Biology 102, 102L, 120, 120L, 121, Biological Sciences 102, 103, and:

a. One course from Wildlife, Fish, and Conservation Biology 123, Entomology 116 or Evolution and Ecology 112-112L; and

b. Two courses from Environmental Science and Policy 116 (or 150C), 151, Hydrologic Science 122, or Wildlife, Fish, and Conservation Biology 157.

5. *Physiological ecology:* Complete Wildlife, Fish, and Conservation Biology 121 and 130, Biological Sciences 102, 103. Choose two courses from Neurobiology, Physiology and Behavior 126, 127, 128, 129, 140 or 141.

6. *Wildlife damage management:* Complete Wildlife, Fish, and Conservation Biology 152, Agricultural Systems and Environment 105 and 110A, and choose one course from Entomology 153 or 156.

7. *Wildlife biology:* Complete Wildlife, Fish, and Conservation Biology 100 or 101-101L, Wildlife, Fish, and Conservation Biology 130 and 151, and two courses from Evolution and Ecology 134L or Wildlife, Fish, and Conservation Biology 110L or 111L, and:

a. Choose two courses from Agricultural Systems and Environment 130, Plant Biology 102 (or 108), 117, 121, 144, 178, Evolution and Ecology 121, Environmental Science and Policy 155, Wildlife, Fish, and Conservation Biology 156.

b. Choose one course from Wildlife, Fish, and Conservation Biology 131, 136, 152, 157, Agricultural Systems and Environment 135.

8. *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 4-6 additional courses with a common theme.

## Unrestricted Electives .....

**Total Units for the Degree (minimum) .....**180

**Major Adviser.** D. Van Vuren.

Students transferring to 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. See receptionist in 1088 Academic Surge Building or telephone 752-6586.

**Graduate Study.** See the Graduate Studies chapter in this catalog.

## Courses in Wildlife, Fish and Conservation Biology (WFC)

### Lower Division Courses

#### 10. Wildlife Ecology and Conservation (4) I.

Moyle, Kelt

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.

#### 92. Internship (1-6) I, II, III. The Staff

(Department Chairperson in charge)  
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) III. Elliott-Fisk

Lecture—1 hour; laboratory—3 hours; fieldwork—30 hours total (requires 3 of 6 weekend field trips); term paper. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100 and consent of instructor; additional course work in systematics of groups of

organisms recommended. Introduction to field methods for research on the ecology and conservation of vertebrates, invertebrates, and plants, and to the scientific method, experimental design, and data presentation. Requires preparation of a term project.

**101. Field Research in Wildlife Ecology (2) I.**

Anderson, Eadie, Kelt, Van Vuren  
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.

**101L. Field Research in Wildlife Ecology: Laboratory (4) I.**

Anderson, Eadie, Kelt, Van Vuren  
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.

**\*102. Field Studies in Fish Biology (1) III.**

Moyle, Cech  
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.

**\*102L. Field Studies in Fish Biology: Laboratory (6) III.**

Moyle, Cech  
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.

**110. Biology and Conservation of Wild Mammals (3) III.**

Kelt  
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; course in ecology recommended. Biology and conservation of wild mammals. Natural history, taxonomy, geographical-ecological distribution; anatomical-physiological-behavioral adaptations of mammals to their environment; and research/management techniques are emphasized.

**110L. Laboratory in Biology and Conservation of Wild Mammals (2) III.**

Kelt  
Laboratory—6 hours. Prerequisite: course 110 (may be taken concurrently) and consent of instructor. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Limited enrollment.

**111. Biology and Conservation of Wild Birds (3) I.**

Anderson, Eadie  
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Evolution and Ecology 101. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation.

**111L. Laboratory in Biology and Conservation of Wild Birds (2) I.**

Anderson, Eadie  
Laboratory—6 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. Limited enrollment.

**120. Biology and Conservation of Fishes (3) I.**

Moyle  
Lecture—3 hours. Prerequisite: Biological Sciences 1B. Evolution, ecology, and conservation of marine and freshwater fishes.

**120L. Laboratory in Biology and Conservation of Fishes (1) I.**

Moyle  
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.

**121. Physiology of Fishes (4) II.**

Cech  
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.

**122. Population Dynamics and Estimation (4) III.**

Botsford  
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.

**\*123. Freshwater Invertebrate Ecology (4) III.**

N. Erman  
Lecture/discussion—2 hours; laboratory—3 hours; fieldwork—3 hours; one all-day Saturday field trip required. Prerequisite: Biological Sciences 1A and 1B or the equivalent. Ecology and classification of freshwater invertebrates with emphasis on life history, habitat, diversity, and behavior. Invertebrate monitoring to assess environmental impacts and classification based on morphology as a tool for understanding ecology and biology of aquatic organisms. GE credit: SciEng, Wrt.

**\*130. Physiological Ecology of Wildlife (4) II.**

The Staff  
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.

**\*131. Biology and Management of Cervidae (3) III.**

The Staff  
Lecture—2 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101 and Evolution and Ecology 101, or the equivalent; course 110 recommended. Evolution, biology, and management of cervids. Topics include differences in nutritive ecology, bioenergetics, reproduction and growth, use of habitats, and research methodologies. Emphasis on North American species of caribou, elk, moose, and deer. Offered in alternate years.

**\*136. Ecology of Waterfowl and Game Birds (3) II.**

Eadie  
Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 111L or the equivalent. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in alternate years.

**\*140. Ecology and Evolution of Vertebrate Social Organization (4) II.**

The Staff  
Lecture—4 hours. Prerequisite: Biological Sciences 1B or upper division ecology course (Evolution and Ecology 101 or the equivalent). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to humans and other primates. Offered in alternate years. GE credit: SciEng, Wrt.

**\*141. Behavioral Ecology (3) II.**

Caro  
Lecture—3 hours. Prerequisite: Evolution and Ecology 101. Basic theories underlying the functional and evolutionary significance of behavior, and the role of eco-

logical constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. Offered in alternate years. GE credit: SciEng, Wrt.

**151. Wildlife Ecology (4) I.**

Van Vuren  
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences, 1A, 1B, 1C 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.

**152. Ecological Management of Problem Wildlife (3) II.**

Van Vuren  
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, and 1C, or the equivalent. Ecological approaches to managing wild vertebrates that cause problems for agriculture, public health, or conservation of biodiversity. Offered in alternate years.

**153. Wildlife Ecotoxicology (4) II.**

Anderson  
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) III.**

Caro  
Lecture—3 hours; term paper (will be one or more book reviews). Prerequisite: Evolution and Ecology 101 or Environmental Studies 100 or the equivalent. An introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats.

**156. Plant Geography (4) II.**

Elliott-Fisk  
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.

**\*157. Coastal Ecosystems (4) II.**

Elliott-Fisk  
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.

**190. Proseminar in Wildlife and Fisheries Biology (1) I, II, III.**

The Staff (Chairperson in charge)  
Seminar—1 hour. Prerequisite: upper division standing in biological sciences or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated twice for credit. (P/NP grading only.)

**190C. Research Group Conference (1) I, II, III.**

The Staff (Chairperson in charge)  
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only.)

**\*191. Museum Science (2) II.**

Cole  
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. Offered in alternate years. (P/NP grading only.)



**192. Internship** (1-12) I, II, III, summer. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

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 twice for credit.

**197T. Tutoring in Wildlife and Fisheries** (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III.

The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

## Graduate Courses

**222. Advanced Population Dynamics** (3) II.

Botsford

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.

**290. Seminar** (1-3) I, II, III. The Staff (Chairperson in charge)

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.)

**290C. Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**291. Seminar in Aquatic Ecology** (2) III. Moyle  
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.)

**292. Physiology of Fishes Seminar** (1) I. Cech  
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 twice for credit. (S/U grading only.)

**\*293. Seminar in Wildlife Disease Ecology** (2) II. Theis (Medical Microbiology) in charge, Jacobsen

Seminar—2 hours. Prerequisite: graduate standing or advanced undergraduate in biology. Presentation and analysis of assigned research papers on disease ecology of wild vertebrates related to considerations of habitat quality, population regulation, wildlife management, and/or implications for human or domestic animal health. (S/U grading only.)

**\*294. Seminar in Behavioral Ecology of Predators and Prey** (3) II. Caro

Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of research papers on social and foraging behavior of predatory animals, anti-predator strategies of prey species, co-evolution of predators and prey, and ecology of predator-prey interactions. May be repeated twice for credit. Offered in alternate years.

**295. Seminar in Wildlife Ecotoxicology** (3) II. Anderson

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) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

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## Wine Production

See **Fermentation Science; Food Science and Technology; Microbiology; Viticulture and Enology**

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## Women's Studies

(College of Letters and Science)

Suad Joseph, Ph.D. Program Director

Program Office, 2201 Hart Hall (530-752-4686)

World Wide Web: <http://cougar.ucdavis.edu/wms>

### Committee in Charge

Rosa Linda Fregoso, Ph.D. (*Women's Studies*)

Wendy Ho, Ph.D. (*Asian American Studies, Women's Studies*)

Carole Joffe, Ph.D. (*Sociology, Women's Studies*)

Suad Joseph, Ph.D. (*Anthropology, Women's Studies*)

Susan Kaiser, Ph.D. (*Textiles and Clothing*)

Linda A. Morris, Ph.D. (*English*)

Judith Newton, Ph.D. (*Women's Studies*)

Sarah Projansky, Ph.D. (*Women's Studies*)

Ella Ray, Ph.D. (*African American and African Studies*)

Catherine Robson, Ph.D. (*English*)

Belinda Robnett, Ph.D. (*Sociology, Women's Studies*)

Judith Stacey, Ph.D. (*Sociology, Women's Studies*)

### Faculty

Charlayne Allan, Lecturer (*Classics*)

Carole Blair, Ph.D., Associate Professor (*American Studies*)

Cynthia L. Brantley, Ph.D., Associate Professor (*History*)

JoAnn Cannon, Ph.D., Professor (*French and Italian*)

Sue-Ellen Case, Ph.D., Professor (*Dramatic Art*)

Angie Chabram-Dermersesian, Ph.D., Associate Professor (*Chicana/o Studies*)

Elizabeth Constable, Ph.D., Assistant Professor (*French and Italian*)

Joanne Diehl, Ph.D., Professor (*English*)

Karen P. Erickson, Ph.D., Professor (*Psychology*)

Diane Felmlee, Ph.D., Professor (*Sociology*)

Magaret W. Ferguson, Ph.D., Professor (*English*)

Gail Finney, Ph.D., Professor (*Comparative Literature, German*)

Yvette Flores-Ortiz, Ph.D., Associate Professor (*Chicana/o Studies*)

Ruth Frankenberg, Ph.D., Associate Professor (*American Studies*)

Rosa Linda Fregoso, Ph.D., Associate Professor (*Women's Studies*)

Sandra Gilbert, Ph.D., Professor (*English*)

Karen Halttunen, Ph.D., Professor (*History*)

Inés Hernández-Ávila, Ph.D., Associate Professor (*Native American Studies*)

Lynn Hershman, M.F.A., Professor (*Art*)

Wendy Ho, Ph.D., Assistant Professor (*Asian American Studies, Women's Studies*)

Mary Jackman, Ph.D., Professor (*Sociology*)

Carole Joffe, Ph.D., Professor (*Sociology, Women's Studies*)

Alessa Johns, Ph.D., Assistant Professor (*English*)

Suad Joseph, Ph.D., Professor (*Anthropology*)

Susan Kaiser, Ph.D., Professor (*Textiles and Clothing*)

Cathy Kudlick, Ph.D., Associate Professor (*History*)

Anna K. Kuhn, Ph.D., Professor (*German*)

Kari Lokke, Ph.D., Associate Professor (*Comparative Literature*)

Dianne Sachko Macleod, Ph.D., Associate Professor (*Art History*)

Martha Macri, Ph.D., Associate Professor (*Anthropology, Native American Studies*)

Susan Mann, Ph.D., Professor (*History*)

Sandra J. McPherson, B.A., Professor (*English*)

Jay Mechling, Ph.D., Professor (*American Studies*)

Barbara Metcalf, Ph.D., Professor (*History*)

Janet Momsen, Ph.D., Professor (*Geography*)

Patricia Moran, Ph.D., Associate Professor (*English*)

Linda Morris, Ph.D., Professor (*English*)

Harriet Murav, Ph.D., Associate Professor (*Russian*)

Judith Newton, Ph.D., Professor (*Women's Studies*)

Beatriz M. Pesquera, Ph.D., Associate Professor (*Chicana/o Studies*)

Michele Praeger, Ph.D., Associate Professor (*French and Italian*)

Sarah Projansky, Ph.D., Assistant Professor (*Women's Studies*)

Ella Ray, Ph.D., Assistant Professor (*African American and African Studies*)

Donna Reed, Ph.D., Lecturer (*Comparative Literature*)

Janelle Reinelt, Ph.D., Professor (*Dramatic Art*)

Ada Riddell, Ph.D., Senior Lecturer (*Chicana/o Studies*)

Belinda Robnett, Ph.D., Assistant Professor (*Sociology, Women's Studies*)

Catherine Robson, Ph.D., Assistant Professor (*English*)

Ruth E. Rosen, Ph.D., Professor (*History*)

Luana Ross, Ph.D., Assistant Professor (*Native American Studies*)

Roger Rouse, Ph.D., Assistant Professor (*Anthropology*)

Suzana Sawyer, Ph.D., Assistant Professor (*Anthropology*)

Seth Schein, Ph.D., Professor (*Comparative Literature*)

Juliana Schiesari, Ph.D., Professor (*French and Italian*)

Carol Smith, Ph.D., Professor (*Anthropology*)

Janet Smith, Ph.D., Professor (*Anthropology*)

Victoria Smith, Ph.D., Associate Professor (*Sociology*)

Barbara Sommer, Ph.D., Lecturer (*Psychology*)

Judith Stacey, Ph.D., Professor (*Sociology, Women's Studies*)

Lenora A. Timm, Ph.D., Professor (*Linguistics*)

Patricia Turner, Ph.D., Professor (*African American Studies, American Studies*)  
 David Van Leer, Ph.D., Professor (*English*)  
 Sophie Volpp, Ph.D., Assistant Professor (*East Asian Languages and Cultures*)  
 Martha West, J.D., Professor (*Law*)  
 Diane Wolf, Ph.D., Associate Professor (*Sociology*)

**The Major Program**

Women's Studies is an interdisciplinary major founded on the 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, and sexual and national identities are constructed in relation to each other. 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 Africa, the Caribbean, the Americas, China, Europe, Japan, India, various countries of the Middle East, Southeast Asia, and the United States.

**The Program.** Students majoring in this field may take courses in African American and African studies, American studies, anthropology, comparative literature, English, history, linguistics, Chicana/o studies, political science, psychology, sociology, Asian American studies, Native American studies, French, German, Italian, Spanish, textiles and clothing, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

**Career Alternatives.** The B.A. degree in Women's Studies provides excellent grounding for undergraduates with career aspirations in law, medicine, public administration, and social services. Students wishing to pursue doctoral work will also find that interdisciplinary training in Women's Studies equips them with theoretical and methodological strengths in most disciplines and applied research fields. Increasingly, specialists in Women's Studies are being used as consultants in industry, higher education, insurance companies and personnel firms. State and federal government agencies require people who have special training in understanding gender relations. Finally, educational institutions need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

**A.B. Major Requirements:**

|                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                  | UNITS     |
| <b>Preparatory Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                          | <b>20</b> |
| Two courses from Women's Studies 20, 50, 70 .....                                                                                                                                                                                                                                                                                                                                                                                | 8         |
| Three courses selected from the following:<br>African American and African Studies 10,<br>15, American Studies 1E, 1F, Anthropology 2,<br>Art History 15, Asian American Studies 1, 2,<br>Chicana/o Studies 10, 20, Classics 15,<br>Comparative Literature 12, English 30A or 30B,<br>45, 46A or 46B or 46C, History 72A,<br>72B, Native American Studies 1, 10,<br>Psychology 1, Sociology 1, 2, 3, Women's<br>Studies 80 ..... | 12        |
| <b>Depth Subject Matter</b> .....                                                                                                                                                                                                                                                                                                                                                                                                | <b>44</b> |
| Women's Studies 103, 104, 190 and one<br>additional upper division Women's Studies<br>course .....                                                                                                                                                                                                                                                                                                                               | 16        |
| Cross-Cultural Requirement .....                                                                                                                                                                                                                                                                                                                                                                                                 | 16        |
| Choose four courses (at least one from<br>each category). Courses used to meet<br>this requirement may not duplicate those<br>used to meet the requirement for Gen-<br>der-based Courses. The list that follows<br>represents a partial list of options; other<br>courses may be included with the con-<br>sent 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 102, 122, Native American Studies 180, Sociology 134, Women's Studies 160, 180.

*Cultures Outside the United States*  
 Anthropology 131, 133, Comparative Literature 135, 138, 159C, English 185A, 185B, French 133, German 129, History 102G, 102H, 148A, 148B, Italian 141, Sociology 145B, Women's Studies 102, 182, 184.

*Historical Material Prior to 1900*  
 Asian American Studies 112, English 185A, History 102G, 102H, 148A, 148B, Italian 141, Native American Studies 180.

Gender-based Courses.....12  
 Choose one of two tracks: *Disciplinary* or *Thematic*.

**Disciplinary track**  
 Choose three courses from one of the following focus groups:

*Anthropology focus:*  
 Anthropology 130, 131, 134, 139, 148B, 158.

*History focus:*  
 History 102H, 102G, 148A, 148B.

*Literature and Language focus:*  
 Comparative Literature 135, 138, 159C, English 181, 185A, 185B, French 133, German 129, Italian 141, Linguistics 113.

*Sociology and Psychology focus:*  
 Chicana/o Studies 122, Psychology 114, 149, Sociology 131, 132, 133, 134, 145B, 172.

**Thematic track**  
 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). 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     |
| <b>Women's Studies</b> .....                                                                                                                                                                                                                                              | <b>24</b> |
| Women's Studies 20, 50, 70 or 80 .....                                                                                                                                                                                                                                    | 4         |
| Ethnic studies/Women of color in the U.S.,<br>choose one from: African American and<br>African Studies 123, Asian American<br>Studies 112, Chicano Studies 102, Native<br>American Studies 180, Sociology 134,<br>Women's Studies 195 .....                               | 4         |
| Culture outside the U.S., chose one from:<br>Anthropology 130, 131, Classics 15,<br>Comparative Literature 135, East Asian<br>Studies 113, English 185A, 185B, Ger-<br>man 129, History 102H, 102O, 148A,<br>148B, Sociology 145B, Women's Studies<br>102, 182, 184 ..... | 4         |
| Additional Electives from approved list of<br>upper division cross-listed and Women's<br>Studies courses .....                                                                                                                                                            | 12        |
| Note: With prior consultation with an<br>adviser, other upper division courses may<br>be accepted toward the minor program.<br>Under no circumstances may more than<br>one lower division course be offered in<br>satisfaction of requirements for the minor.             |           |

\*Course not offered this academic year.

**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's Studies Program offers a designated emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of twelve other affiliated departments. See "Feminist Theory and Research."

**Courses in Women's Studies (WMS)**

**Lower Division Courses**

**20. Cultural Representations of Gender** (4) III. Projansky

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.

**50. Introduction to Women's Studies** (4) I, II, III.

Fregoso, Robnett, Newton  
 Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will survey and integrate literary, anthropological, psychological, historical, sociological and biological perspectives on the study of sex roles. GE credit: ArtHum or SocSci, Div, Wrt.

**\*60. Feminist Perspectives on Western Social Thought** (4) I. Fregoso

Lecture/discussion—4 hours. A critical introduction to major traditions of social thinking in the West from a feminist perspective. GE credit: ArtHum or SocSci, Div.

**70. Theory and History of Sexualities** (4) I. The Staff

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.

**\*80. Special Topics in Women's Studies** (4) II.

The Staff  
 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.

**\*90X. Lower Division Seminar** (2) II. West

Seminar—2 hours. Examination of a special topic in Women's Studies through shared readings, discussions, and written assignments. Offered in alternate years.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Director in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.

The Staff (Director in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**\*102. Colonialism, Nationalism, and Women** (4)

II. Joseph  
 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.

**103. Introduction to Feminist Theory** (4) I.

Robnett  
 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.

**104. Feminist Approaches to Inquiry** (4) III.

Projansky

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.

**\*130. Feminism and the Politics of Family Change** (4) III. Stacey

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.

**139. Feminist Cultural Studies** (4) III.

Frankenberg

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.

**140. Gender and Law** (4) II. West

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.

**\*158. Contemporary Masculinities** (4) III.

Newton

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.

**\*160. Representations of Women of Color in Cinema** (4) I. Fregoso

Fregoso

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.

**162. Feminist Film Theory and Criticism** (4) I.

Fregoso

Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Contemporary issues in feminist film theory including representation, spectatorship, and cultural production. Film stars, women filmmakers and the intersection of gender, race, sexuality and class in films and their audiences. GE credit: ArtHum, Div.

**164. Topics in Gender and Cinematic Representation** (4) I, II, III. Fregoso/Projansky

Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Examines a specific topic within the broader rubric of "gender and cinema." Topics vary with instructor. May be repeated twice for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.

**180. Women of Color Writing in the United States** (4) III. Ho

Ho

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.

**182. Globalization, Gender and Identity** (4) II.

Joseph

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.

**\*184. Gender in the Arab World** (4) III. Joseph

Lecture/discussion—4 hours. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. GE credit: SocSci, Div, Wrt.

**\*187. Gender and Social Policy** (4) II. The Staff

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.

**190. Senior Seminar** (4) II. Robnett

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.

**192. Internship in Women's Studies** (1-12) I, II, III. The Staff (Director in charge)

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.)

**194HA-194HB. Senior Honors Project in Women's Studies** (4-6) I, II, III. Faculty/The Staff

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.)

**195. Thematic Seminar in Women's Studies** (4) I, II. Morris, Joffe

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.

**197T. Tutoring in Women's Studies** (1-4) I, II, III. The Staff (Director in charge)

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) I, II, III. The Staff (Director in charge)

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**Graduate Courses****200A. Current Issues in Feminist Theory** (4) I. Robnett

Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields.

**200B. Problems in Feminist Research** (4) II. Newton

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.

**201. Special Topics in Feminist Theory and Research** (4) II, III. The Staff

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.

**299. Special Study for Graduate Students** (1-12) I, II, III. The Staff

(S/U grading only.)

**Professional Course****396. Teaching Assistant Training Practicum** (1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Zoology

**See Biological Sciences—Evolution and Ecology**

## Addendum

## Social Sciences

(College of Letters and Science)

Fred Block, Ph.D., Program Director

Program Office, 108 Sproul Hall (530-752-9933)

**Committee in Charge**Fred Block, Ph.D. (*Sociology*)Colin Cameron, Ph.D. (*Economics*)Gregory Clark, Ph.D. (*Economics*)Dennis J. Dingemans, Ph.D. (*Social Sciences*)Emily O. Goldman, Ph.D. (*Political Science*)William W. Hagen, Ph.D. (*History*)John R. Hall, Ph.D. (*Sociology*)John E. Roemer, Ph.D. (*Economics*)Suzana M. Sawyer, Ph.D. (*Anthropology*)Niels G. Waller, Ph.D. (*Psychology*)**Faculty**

Dennis J. Dingemans, Ph.D., Associate Professor,  
*Academic Senate Distinguished Teaching Award*

**Emeriti Faculty**

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.



# APPENDIX

## RESIDENCE FOR TUITION INFORMATION

### 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. The residence determination date is 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.

### Law 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 (see below).

### Who is a Resident?

If you are an adult student (at least 18 years of age) 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, O-1, O-3, or R. **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. **Effective Fall 1993, if your parents are not residents of California or you were not previously enrolled as a UC student, you will be required to be financially independent in order to be a resident for tuition purposes. Your residence cannot be derived from your spouse or your parents.**

### 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 residence 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 legal dependents other than a spouse; (5) you are married, 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: Financial independence will not be a factor in residence

status for graduate student instructors, graduate student teaching assistants, research assistants, junior specialists, post-graduate researchers, graduate student researchers, and teaching associates who are employed 49% or more of full time or who have funding equivalent to employment that is 49% or more of full time for the term for which classification is sought.)

### **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.**

### **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**

#### **1. 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.

#### **2. 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.

#### **3. Self-Support**

You may be entitled to resident status if you are a U.S. citizen or eligible alien and either a minor or age 18 and can prove the following: 1) you lived in California for the entire year immediately preceding the residence determination date; 2) you have been self-supporting for that year; and 3) you intend to make California your permanent home.

#### **4. 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**

#### **1. 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 until you have lived in California long enough to become a resident. You must provide the residence deputy on campus with 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.

#### **2. Spouse or Other Dependents of Military Personnel**

You are exempt from payment of the nonresident tuition fee if you are a spouse or 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. The exemption is available until you have lived in California long enough to become a resident. 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 under the conditions listed above.

#### **3. Child or Spouse of Faculty Member**

To the extent funds are available, if you are an unmarried dependent child under age 21 or the spouse 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.

#### **4. Child or Spouse of University Employee**

You may be entitled to resident classification if you are the unmarried dependent child or the spouse of a full-time University employee whose assignment is outside of California (e.g., Los Alamos Scientific Laboratory). Your parent's or spouse's employment status with the University must be ascertained each term.

#### **5. Child 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 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.

#### **6. Dependent 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.

#### **7. Native American Graduate of BIA School**

A student who is a graduate of a California school operated by the Federal Bureau of Indian Affairs (BIA), i.e., Sherman Indian High School, and who enrolls at the University of California may be eligible for an exemption of the nonresident fee.

### 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.

### Classification to Resident Status

All changes of status must be initiated prior to the payment deadline for the term which you intend to be reclassified.

### 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.

### Inquiries and Appeals

Inquiries regarding residence requirements, determination and/or recognized exceptions should be directed to the Residence Deputy, Office of the Registrar, 12 Mrak Hall, One Shields Avenue, Davis, California 95616, (530-752-0879).

#### **NO OTHER UNIVERSITY PERSONNEL ARE AUTHORIZED TO SUPPLY INFORMATION RELATIVE TO RESIDENCE REQUIREMENTS FOR TUITION PURPOSES.**

You are cautioned that this summary is **not** a complete explanation of the law regarding residence. *Please note that changes may be made in the residence requirement between the publication of this statement and the relevant residence determination date.* Any student, following a final decision on residence classification by the residence deputy, may appeal in writing to the legal analyst (Legal Analyst—Residence Matters, 111 Franklin St., 8th Floor, Oakland, CA 94607-5206) within 45 days of notification of the residence deputy's final decision.

### UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS AND PRIVACY

**Nondiscrimination.** The University of California, in accordance with applicable Federal and State laws and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran. 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 Student Judicial Affairs, Room 308, North Hall, 530-752-1128.

**Sexual Harassment.** Sexual harassment of all persons who participate in University programs and activities is prohibited by law and by University regulation (Policy 380-12). Sexual harassment is unacceptable and will not be condoned on the UC Davis campus. The Sexual Harassment Education Program (752-2255) provides information and assists in resolving complaints of sexual harassment informally. Formal grievance procedures for student complaints charging legally impermissible discrimination (Policy 280-05) are available in the Office of Student Judicial Affairs and may be used to bring complaints of sexual harassment or other discrimination. Students may receive informal counseling and formal assistance by contacting any of the following offices: Vice Chancellors, Deans of the Schools and Colleges, the Office of Student Judicial Affairs, or the Sexual Harassment Education Program. In addition, the ASUCD Student Grievance Center, Counseling Center, and the Women's Resources and Research Center are available to provide referral service.

**Disclosures from Student Records.** In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of the University have the right:

- To inspect and review their own student records within 45 days of the date the University receives a written request for access.
 

Students should submit their requests in writing to the Registrar, Dean, Department Chair, or other appropriate campus official for the office having custody of the requested records. The request must identify the record(s) they wish to inspect and review. The campus official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the official receiving the request, that official shall advise the student of the correct official and redirect the request.
- The right to request the amendment of their own student records if a student believes the records are inaccurate or misleading.
 

Students should submit a written request to amend a record that they believe is inaccurate or misleading to the campus official responsible for the record, clearly identifying the portion of the record they want changed, and specifying why it is believed to be inaccurate or misleading. If the University determines that the record should not be amended as requested by the student, the University will notify the student of the decision and advise him/her of the right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
- The right to consent to disclosures of personally identifiable information contained in their student records, except to the extent that law and policy authorize disclosure without consent.



One exception permitting disclosure without consent is disclosure to campus officials having a legitimate educational interest in the records. A campus official is any individual designated by the campus to perform an assigned function on behalf of the campus. Legitimate educational interest means a demonstrated need to know by officials who act in a student's educational interest. A campus official has a "legitimate educational interest" in a record if the official is performing a task (1) specified in his or her job description; (2) specifically related to the official's participation in the student's education; (3) specifically related to the discipline of a student; or (4) specifically related to providing a service or benefit associated with a student or student's family, such as health care, counseling, job placement, or financial aid.

Another exception permitting disclosure without consent is Public Information, defined as information contained in a student record that would not generally be considered harmful or an invasion of privacy if disclosed, unless the student has notified the Registrar that such information is to be treated as confidential with respect to him/herself. UC Davis has designated as public the following categories of information regarding students: the student's name, address(es) and telephone number(s) (local and/or permanent addresses, including e-mail addresses); date and place of birth; major field of study; dates of attendance; number of course units in which enrolled; 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 intercollegiate athletic teams.

Parental/guardian Information is confidential. It is used by the University only for notification of events, ceremonies, awards, and development or in case of an emergency involving the student.

- The right to file a complaint with the U.S. Department of Education concerning alleged failures by UC Davis to comply with the requirements of the Federal Educational Rights and Privacy Act, addressed to the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW., Washington, DC. 20202-4605

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual, Section 320-21, "Disclosure of Information from Student Records."

Questions about these rights should be referred to Jeanne Wilson, Office of Student Judicial Affairs, 530-752-1128.

Students may request in writing by the tenth day of instruction that their addresses, including e-mail address, and telephone listings or all personally identifiable information from their records not be regarded as public information. Students who desire to withhold their addresses and telephone listings may so indicate on the Student Address Form included with registration materials. Students who wish to keep their e-mail addresses confidential should connect to mothra.ucdavis.edu and type "services" at the login prompt, and follow the instructions provided for changing "whois" directory information. **If a student does not indicate that he or she wishes to keep his or her address and telephone number confidential, then the information may be released as a matter of public record and will be included in a campus Student Directory.** The decision to withhold address and phone number or all information can be reversed by filing a form with the Office of the Registrar.

Students who desire to withhold all information from the category of public information must file a form in the Office of the Registrar. Students availing themselves of this right should understand what the consequences of such action may be. For example, if all information is designated non-public information, the campus cannot make public any Honors received by the student (e.g., the award of a Regents' Scholarship or election to Phi Beta Kappa) and cannot

include the student's name and degree earned in the campus commencement program without the student's written consent. Similarly, the student's status as a student or any degrees earned cannot be verified for potential employers without the student's written consent.

**Privacy Act.** A student's Social Security number is used to verify personal identity in the UCD Student Records System. In accordance with the Federal Privacy Act of 1974, students are hereby notified that disclosure of their social security number is mandatory. This recordkeeping system was established prior to January 1, 1975 pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9, of the California Constitution.

## 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 Rape Prevention Education Office, located in the UC Davis Police Department, 530-752-3299, or e-mail [jmbeeman@ucdavis.edu](mailto:jmbeeman@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, P.O. Box 9990, Mills College, Oakland, CA 94613, (510) 632-5000, 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 Association of American Law Schools, American Bar Association, American Dietetic Association, Association of American Medical Colleges, American Association for Accreditation of Laboratory Animal Care, Accreditation Council for Graduate Medical Education, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, Computing Science Accreditation Commission, American Chemical Society, American Assembly of Collegiate Schools of Business, American Society of Landscape Architects, the Commission on Teacher Credentialing, and the Joint Commission on Accreditation of Hospitals. Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of the Provost, 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. Richard C. Atkinson 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

Pete Wilson

*Governor of California and President of The Regents*

Gray Davis

*Lieutenant Governor of California*

Antonio R. Villaraigosa

*Speaker of the Assembly*

Delaine Eastin

*State Superintendent of Public Instruction*

Irene Miura

*President of the Alumni Associations of the University of California*

David C. Willmon

*Vice President of the Alumni Associations of the University of California*

Richard C. Atkinson

*President of the University*

### Appointed Regents

(Current term expires on March 1 of year indicated)

|                        |        |
|------------------------|--------|
| William T. Bagley      | (2002) |
| Carol Chandler         | (2009) |
| Frank W. Clark, Jr.    | (2000) |
| Ward Connerly          | (2005) |
| John G. Davies         | (2004) |
| John F. Hotchkis       | (2009) |
| S. Sue Johnson         | (2002) |
| Meredith J. Khachigian | (2001) |
| Howard H. Leach        | (2001) |
| David S. Lee           | (2006) |
| Velma Montoya          | (2005) |
| S. Stephen Nakashima   | (2004) |
| Ralph Ochoa            | (2000) |
| Gerald L. Parsky       | (2008) |
| Peter Preuss           | (2008) |
| Tom Sayles             | (2006) |

*Student Regent*

Max R. Espinoza (June 30, 1999)

*Faculty Representatives*

Aimée Dorr (August 31, 1999)

Sandra Weiss (August 31, 1998)

### Principal Officers of The Regents

James E. Holst

*General Counsel and Vice President—Legal Affairs*

Patricia A. Small

*Treasurer*

Leigh Trivette

*Secretary*

## ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Richard C. Atkinson

*President of the University*

C. Judson King

*Provost and Senior Vice President—Academic Affairs*

V. Wayne Kennedy

*Senior Vice President—Business and Finance*

Bruce B. Darling

*Vice President—University and External Relations*

Cornelius L. Hopper, M.D.

*Vice President—Health Affairs*

William H. Gurtner

*Vice President—Clinical Services Development*

W.R. Gomes

*Vice President—Agriculture and Natural Resources*

Anne C. Broome

*Vice President—Financial Management*

Lawrence C. Hershman

*Vice President—Budget*

James E. Holst

*General Counsel and Vice President—Legal Affairs*

## UNIVERSITY CHANCELLORS

Robert M. Berdahl

*Chancellor at Berkeley*

Larry N. Vanderhoef

*Chancellor at Davis*

Ralph J. Cicerone

*Chancellor at Irvine*

Albert Carnesale

*Chancellor at Los Angeles*

Raymond L. Orbach

*Chancellor at Riverside*

Robert C. Dynes

*Chancellor at San Diego*

Haile T. Debas

*Chancellor at San Francisco*

Henry T. Yang

*Chancellor at Santa Barbara*

M.R.C. Greenwood

*Chancellor at Santa Cruz*

## ADMINISTRATIVE OFFICERS—UC DAVIS

### Chancellor

Larry N. Vanderhoef, Ph.D.

### Chancellors Emeritus

Theodore L. Hullar, Ph.D.

James H. Meyer, Ph.D.

### Vice Chancellors

Robert D. Grey, Ph.D.

*Provost and Executive Vice Chancellor*

Janet C. Hamilton, B.S.

*Vice Chancellor—Administration*

Celeste E. Rose, J.D.

*Vice Chancellor—University Relations*

Kevin M. Smith, Ph.D.

*Vice Chancellor—Research*

Carolyn F. Wall, Ph.D.

*Vice Chancellor—Student Affairs*

### Vice Provosts

Peter Dale, Ph.D.

*Vice Provost—Undergraduate Studies*

*Vice Provost—University Outreach and International Programs*

*Vice Provost—Academic Personnel*

### Assistant Chancellor

Sally P. Springer, Ph.D.

**Associate/Assistant Vice Chancellors**

- Carole A. Barone, Ph.D.  
*Associate Vice Chancellor—Information Technology*
- Anthony B. Flores, M.P.A.  
*Associate Vice Chancellor—Finance, Accounting Officer*
- Robert G. Franks, Ph.D., J.D.  
*Associate Vice Chancellor—Student Affairs  
(Administration and Student Life)*
- Janet C. Gong, Ed.D.  
*Assistant Vice Chancellor—Student Affairs  
(Student Relations)*
- Virginia Kelsch, B.A.  
*Associate Vice Chancellor—University Relations*
- André Lauchli, Ph.D.  
*Associate Vice Chancellor—Research*
- Yvonne L. Marsh, M.S.  
*Assistant Vice Chancellor—Student Affairs  
(Enrollment, Advising and Academic Support Services)*
- Richard J. Meisinger, Jr., Ph.D.  
*Associate Vice Chancellor—Planning and Budget*
- Stan Nosek, M.S.  
*Assistant Vice Chancellor—Management Analysis and  
Planning*
- Darrell P. Ralls, A.B.  
*Associate Vice Chancellor—Facilities*
- Dennis W. Shimek, B.S.  
*Associate Vice Chancellor—Human Resources and  
Risk Management*

**University Librarian**

Marilyn J. Sharrow, M.A.L.S.

**Registrar**

Jack R. Farrell, Ph.D.

**Directors**

- Marjorie M. Dickinson, A.B.  
*Director of Government and Community Relations*
- Patricia A. Kearney, Ph.D.  
*Executive Director, Student Housing and Financial Aid*
- Robert A. Kerr, Ph.D.  
*Executive Director, Cal Aggie Alumni Association*
- Maril R. Stratton, M.A.  
*Director of Public Communications*
- Gary Tudor, Ed.D.  
*Director of Undergraduate Admissions and Outreach Services*
- Michelle Famula, M.D.  
*Director of Cowell Student Health Center*
- Steven H. Weiss, M.B.A.  
*Director of University Cultural Programs*
- Daniel L. Wick, Ph.D.  
*Director of Summer Sessions*
- Greg Warzecka, M.S.  
*Director of Athletics*

**College of Agricultural and Environmental Sciences**

- Barbara O. Schneeman, Ph.D., *Dean*  
———, *Executive Associate Dean*
- Alan Bennett, Ph.D., *Divisional Associate Dean—Plant  
Sciences*
- David S. Reid, Ph.D., *Divisional Associate Dean—Human  
Health and Development*
- Annie King, Ph.D., *Associate Dean—Undergraduate  
Academic Programs*
- Gary Moberg, Ph.D., *Divisional Associate Dean—Animal  
Biology*
- Michael S. Reid, Ph.D., *Divisional Associate Dean—  
Environment*

**College of Engineering**

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- Benjamin J. McCoy, Ph.D., *Associate Dean—Research*
- Zuhair A. Munir, Ph.D., *Associate Dean—Graduate Studies*
- James F. Shackelford, Ph.D., *Associate Dean—Undergraduate  
Studies*

**College of Letters and Science**

- , *Dean—Division of  
Humanities, Arts, and Cultural Studies*
- Steven M. Sheffrin, Ph.D., *Dean—Division of  
Social Sciences*
- Peter A. Rock, Ph.D., *Dean—Division of Mathematical and  
Physical Sciences*
- George G. Roussas, Ph.D., *Associate Dean—Division of  
Statistics*
- Fred E. Wood, Ph.D., *Associate Dean—Undergraduate  
Education*

**Division of Biological Sciences (Intercollege)**

- Mark G. McNamee, Ph.D., *Dean*
- Thomas L. Rost, Ph.D., *Associate Dean*

**Division of Education**

Fred H. Genesee, Ph.D., *Director*

**Graduate School of Management**

- Robert H. Smiley, Ph.D., *Dean*
- Michael W. Maher, Ph.D., *Associate Dean—Academic Affairs*

**Graduate Studies**

- Cristina Gonzalez, Ph.D., *Dean*  
———, *Associate Dean for Programs*
- Rosemarie H. Kraft, Ph.D., *Associate Dean for Students*

**School of Law**

- Rex R. Perschbacher, J.D., *Dean*  
———, *Associate Dean—Academic Affairs*
- Antonia Bernhard, J.D., *Assistant Dean—Student Affairs*

**School of Medicine**

- Joseph Silva, M.D., *Dean*
- James J. Castles, M.D., *Executive Associate Dean*
- Fitz-Roy E. Curry, Ph.D., *Associate Dean—Research and the  
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- Faith Fitzgerald, M.D., *Assistant Dean for Student Affairs*
- Doreen Franke, M.B.A., *Acting Associate Dean—Administration*
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- Frank J. Loge, M.B.A., *Associate Dean—Hospitals and Clinics*
- Allan D. Siefkin, M.D., *Associate Dean—Clinical Affairs*
- Margaret S. Steward, Ph.D., *Associate Dean—Faculty  
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- Donal A. Walsh, Ph.D., *Associate Dean—Curricular Affairs*

**School of Veterinary Medicine**

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- Robert J. Hansen, Ph.D., *Associate Dean—Student Programs*
- Dallas M. Hyde, Ph.D., *Associate Dean—Research and  
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- Bradford P. Smith, D.V.M., *Associate Dean—Clinical Programs  
and Director—VMTH*
- Stephen W. Barthold, D.V.M., Ph.D., *Associate Dean—  
Comparative Medicine*

**University Extension**

Charles A. Lacy, Ph.D., *Dean*



**PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE<sup>1</sup>**

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 13 percent of graduates who had not decided on a career field at the time of the survey.

| Field of Study <sup>2</sup> , Percentage finding work in field of choice |                                  |
|--------------------------------------------------------------------------|----------------------------------|
| Animal Biology, 83                                                       | Human Health and Development, 77 |
| Biological Sciences, 62                                                  | Interdisciplinary, 63            |
| Engineering, 92                                                          | Letters, 67                      |
| Environmental and Resource Sciences<br>and Policy, 78                    | Mathematics and Statistics, 90   |
| Fine Arts, 60                                                            | Plant Sciences, 80               |
| Foreign Languages, 80                                                    | Physical Sciences, 80            |
|                                                                          | Social Sciences, 59              |
| <b>Total, 72</b>                                                         |                                  |

<sup>1</sup>Source: A 1997 survey of June 1996 graduates conducted by Student Affairs Research and Information.

<sup>2</sup>Fields of Study are groups of related undergraduate majors; for example, "Animal Biology" includes Agricultural Science and management, Animal Biology, Animal Science, Animal Science and Management, Avian Science, Entomology, Wildlife and Fisheries Biology, and Wildlife, Fish and Conservation Biology.

**RETENTION DATA<sup>1</sup> AND GRADUATION RATES AT UC DAVIS****Freshmen**

(Retention and graduation rates through Spring 1997 for all undergraduates entering UC Davis from high school.)

| Fall Quarter of<br>Initial Enrollment: | Number<br>of Students | Percent Enrolled<br>4 Quarters | *Percent Graduating in<br>12 Quarters | *Percent Graduating in<br>15 Quarters |
|----------------------------------------|-----------------------|--------------------------------|---------------------------------------|---------------------------------------|
| 1987                                   | 3,405                 | 93%                            | 30%                                   | 73%                                   |
| 1988                                   | 3,492                 | 93%                            | 32%                                   | 74%                                   |
| 1989                                   | 3,187                 | 94%                            | 35%                                   | 74%                                   |
| 1990                                   | 3,229                 | 94%                            | 38%                                   | 73%                                   |
| 1991                                   | 2,356                 | 93%                            | 36%                                   | 71%                                   |
| 1992                                   | 2,930                 | 93%                            | 37%                                   | 66%                                   |

**Transfer Students**

(Retention and graduation rates through Spring 1996 for all undergraduates transferring to UC Davis as juniors.)

| Fall Quarter of<br>Initial Enrollment: | Number<br>of Students | Percent Enrolled<br>4 Quarters | *Percent Graduating in<br>6 Quarters | *Percent Graduating in<br>9 Quarters |
|----------------------------------------|-----------------------|--------------------------------|--------------------------------------|--------------------------------------|
| 1988                                   | 569                   | 91%                            | 31%                                  | 76%                                  |
| 1989                                   | 623                   | 92%                            | 32%                                  | 74%                                  |
| 1990                                   | 844                   | 93%                            | 35%                                  | 77%                                  |
| 1991                                   | 658                   | 93%                            | 42%                                  | 79%                                  |
| 1992                                   | 862                   | 93%                            | 43%                                  | 78%                                  |
| 1993                                   | 863                   | 93%                            | 38%                                  | 76%                                  |
| 1994                                   | 1068                  | 93%                            | 37%                                  | 69%                                  |

\*These are not necessarily quarters of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies. (There are three quarters in each academic year.)

<sup>1</sup>Source: Student Affairs Research and Information, UC Davis (January 1998).

**AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S,  
MASTER'S, AND DOCTORATE DEGREES<sup>1</sup>**

| Field of Study:               | Average Monthly Salary |          |           |
|-------------------------------|------------------------|----------|-----------|
|                               | Bachelor's             | Master's | Doctorate |
| Engineering                   | \$2975                 | \$3435   | \$47171   |
| Humanities/Social Sciences    | \$1963                 | \$2373   | \$3091    |
| Health Sciences/Life Sciences | \$2659                 | \$2965   | \$3934    |
| Physical Sciences             | \$2486                 | \$2993   | \$4297    |

<sup>1</sup>Source: 1996 National Salary Survey data provided by the College Placement Council.

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