ADDRESS DIRECTORY

University of California
Davis, California 95616
(916) 752-1011 (main campus number)

Office of the Chancellor
Mrak Hall
916-752-2085

College of Agricultural and Environmental Sciences
228 Mrak Hall
916-752-0107

College of Engineering
2132 Bainer Hall
916-752-0553

College of Letters and Science
150 Mrak Hall
916-752-0392

Division of Biological Sciences
66 Briggs Hall
916-752-0410

Graduate Studies
252 Mrak Hall
916-752-0650

School of Law
1011 King Hall
916-752-0243

Graduate School of Management
106 AOB 4
916-752-7362

School of Medicine
Medical Sciences 1C
916-752-0331

School of Veterinary Medicine
1016 Harry Hall
916-752-1360

Office of Summer Sessions
44 Mrak Hall
916-752-1647

University Extension
1333 Research Park Drive
916-752-0860

Admissions
Undergraduate: Office of Admissions
175 Mrak Hall
916-752-2971
EOP Office of Admissions
175 Mrak Hall
916-752-2993

Graduate: Graduate Studies Admissions
252 Mrak Hall
916-752-0655

Law: School of Law Admissions
115 King Hall
916-752-6477

Management: Graduate School of Management
106 AOB 4
916-752-7399

Medicine: School of Medicine Admissions
Medical Sciences 1C
916-752-2717

Veterinary Medicine: School of Veterinary Medicine Admissions
1044 Harlan Hall
916-752-1293

Office of the Registrar
124 Mrak Hall
916-752-2973
(for registration information, transcripts, the General Catalog)

Financial Aid Office
North Hall
916-752-2390
(undergraduate and graduate loans, grants, employment information)

Scholarship Office
207 North Hall
916-752-2397
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Studies
252 Mrak Hall
916-752-7481

Teaching and Research Assistantships
Write to department or group concerned.

Housing
Community: Student Housing Office
916-752-2483
Residence Halls: Student Housing Office
916-752-2033
Student Family Housing: Orchard Park
916-752-4000

ASUCD (Associated Students UCD)
3rd floor, Memorial Union
916-752-1990

Disability Resource Center
101 Silo Student Center
916-752-3184 (voice), 916-752-6889 (telephone device for the speech and hearing impaired)

Memorial Union Information Desk
916-752-2222

News Service
334 Mrak Hall
916-752-1930

Relations with Schools/EOP Outreach Services
2026 Chiles Road
916-757-3108

Residency Matters, Legal Analyst
300 Lakeside Dr, 7th Floor
Oakland, CA 94612-3565

Student Health Service
54A Cowell Student Health Center
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

Information Services Office
Buehler Alumni and Visitors Center
916-752-6111
(campus tours, maps, and information)
## ACADEMIC CALENDAR

*Class Schedule and Room Directory available.*

Students should consult the quarterly *Class Schedule and Room Directory* for registration and fee payment dates and information.

### Quarter begins

Final day to petition for reclassification to resident status.

### Instruction begins

Final day:
- of late fee payment
- to change status from part-time to full-time status or vice versa
- to add courses without paying a $3 fee
- to file petitions for PELP

Final day:
- to add or drop courses
- to file to take courses on a P/NP basis
- to file to take courses on a S/U basis

Deadline for filing Independent Study Program project proposal form.

Monday classes meet.

### Instruction ends

Final examinations.

### Quarter ends

Commencement.

### Academic and Administrative Holidays

- **Summer Sessions I and II**

### Financial Aid Deadlines

Filing period for grants, loans, work-study, and California Student Aid awards for 1994-95.

### Filing for Graduation

Filing period for those who expect to complete work for a bachelor’s degree to file with the Office of the Registrar.

Deadline for students who plan to complete a minor program to file with the Dean’s Office.

### Admission Deadlines

Deadline for undergraduates to file admission applications for 1993-94.

Deadline for filing applications with the Registrar for readmission to undergraduate status.

---

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

† For students graduating September 1994, the filing period is May 24–July 1. Deadline to file a minor program with Dean’s Office: July 8.
# DEGREES OFFERED BY UC DAVIS

Undergraduate majors and professional studies are administered by the colleges and schools listed. All graduate programs are administered by Graduate Studies.

<table>
<thead>
<tr>
<th>Major or Discipline</th>
<th>Degree*</th>
<th>Administering School or College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>M.B.A.</td>
<td>Graduate School of Management</td>
</tr>
<tr>
<td>Aeronautical Science and Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>African-American and African Studies (Afro-American Studies)</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Agricultural and Environmental Chemistry</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural and Managerial Economics</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Economics</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Education</td>
<td>credential</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Systems and Environment</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agronomy</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>American Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Animal Behavior</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Animal Science</td>
<td>B.S., M.A.M., M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Animal Science and Management</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Anthropology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Applied Behavioral Sciences</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Art</td>
<td>M.F.A.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Art History</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Art Studio</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Atmospheric Science</td>
<td>B.S., M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Avian Sciences</td>
<td>B.S., M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>B.S.</td>
<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Biochemistry and Molecular Biology</td>
<td>M.S., Ph.D.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>A.B. or B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Biological Systems Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Biophysics</td>
<td>M.S., Ph.D.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Botany</td>
<td>A.B. or B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Cell and Developmental Biology</td>
<td>Ph.D.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Chemical EngineeringMaterials Science and Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Chicana/Chicano Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Child Development</td>
<td>M.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Chinese</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Civil Engineering/Materials Science and Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Classical Civilization</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Classics</td>
<td>M.A.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Community Development</td>
<td>M.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Community Nutrition</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Comparative Pathology</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Computer Science</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Computer Science</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Computer Science and Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Design</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Dietetics</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Dramatic Art</td>
<td>A.B., M.A., M.F.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>East Asian Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Ecology</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Economics</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Education</td>
<td>M.A., M.Ed., Ph.D., Ed.D.¹, credential</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Electrical EngineeringMaterials Science and Engineering</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Engineering</td>
<td>M.Engr., M.S., D.Engr., Ph.D.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Engineering—Applied Science</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>English</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Entomology</td>
<td>B.S., M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental and Resource Sciences</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental Biology and Management</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental Policy, Analysis, and Planning</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental Toxicology</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Exercise Science</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Department</td>
<td>Degree(s)</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Fermentation Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Fiber and Polymer Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Food Biochemistry</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Food Engineering</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Food Science</td>
<td>B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>A.B., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Genetics</td>
<td>B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Geology</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Greek</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>A.B., M.A., M.A.T., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>History of Art</td>
<td>M.A.</td>
<td></td>
</tr>
<tr>
<td>Horticulture</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Human Development</td>
<td>B.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Hydrologic Sciences</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Immunology</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Individual Major</td>
<td>A.B., B.S.</td>
<td></td>
</tr>
<tr>
<td>International Agricultural Development</td>
<td>B.S., M.S.</td>
<td></td>
</tr>
<tr>
<td>International Relations</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Italian</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Landscape Architecture</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Latin</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Linguistics</td>
<td>J.D.</td>
<td></td>
</tr>
<tr>
<td>Materials Science and Engineering</td>
<td>A.B., M.A.</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>A.B. or B.S., M.A., M.A.T., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering/Materials Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>School of Medicine</td>
<td>M.D.</td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Native American Studies</td>
<td>A.B., M.A., M.A.T., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Neurobiology</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Nutrition Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Pharmacology and Toxicology</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td>A.B., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td>B.S. or B.S., M.A.</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>B.S., A.B., B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Plant Biology</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Plant Pathology</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Plant Protection and Pest Management</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Plant Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Political Science</td>
<td>A.B., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Political Science—Public Service</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Population Biology</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Preventive Veterinary Medicine</td>
<td>M.P.V.M.</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Range and Wildlands Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Religious Studies</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Rhetoric and Communication</td>
<td>A.B., M.A.</td>
<td></td>
</tr>
<tr>
<td>Russian</td>
<td>A.B., M.A.</td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td>A.B., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Sociology—Organizational Studies</td>
<td>A.B.</td>
<td></td>
</tr>
<tr>
<td>Soil Science</td>
<td>M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Soil and Water Science</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>A.B., M.A., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td></td>
</tr>
<tr>
<td>Textiles</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Textiles and Clothing</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Vegetable Crops</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Veterinary Medicine</td>
<td>D.V.M.</td>
<td></td>
</tr>
<tr>
<td>Water Science</td>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Wildlife and Fisheries Biology</td>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>Women’s Studies</td>
<td>M.A.</td>
<td></td>
</tr>
<tr>
<td>Zoology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td></td>
</tr>
</tbody>
</table>

*Joint program between UCSD and CSU, Fresno.

*AB = Bachelor of Arts, B.S. = Bachelor of Science, M.A. = Master of Arts, M.A.T. = Master of Agricultural Management, M.A.T. = Master of Arts in Teaching, M.S. = Master of Science, M.P.V.M. = Master of Preventive Veterinary Medicine, Ph.D. = Doctor of Philosophy, J.D. = Doctor of Law, M.D. = Doctor of Medicine, D.V.M. = Doctor of Veterinary Medicine.
MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. The College of Engineering does not offer any minors.

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>Offering Department</th>
<th>Administering College</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American and African Studies (Afro-American Studies)</td>
<td>Human Development</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Aging and Adult Development</td>
<td>Agronomy</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Computing and Information Systems</td>
<td>Entomology</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Entomology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>American Studies</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Anthropology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Aquaculture</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Applied Biological Systems and Technology</td>
<td>Entomology</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Art History</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Art Studio</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Asian American Studies</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
<tr>
<td>Botany</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Chicana/Chicano Studies</td>
<td>Applied Behavioral Sciences</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Chinese</td>
<td>Nutrition</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Community Development</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Community Nutrition</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Dramatic Art</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>East Asian Studies</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Energy Policy</td>
<td>Environmental Studies</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>English</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Entomology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Environmental Horticulture</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental Policy Analysis</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Environmental Geology</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Environmental Toxicology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Fiber and Polymer Science</td>
<td>Textiles and Clothing</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Food Service Management</td>
<td>Nutrition</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>French</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Geography</td>
<td>Geology</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Geology</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Geophysics</td>
<td>Classics</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>German</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Greek</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>History and Philosophy of Science</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Human Development</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Insect Ecology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>International Agricultural Development</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Italian</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Japanese</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Latin</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Linguistics</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Medicinal-Veterinary Entomology</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Medieval Studies</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Native American Studies</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Nature and Culture</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Nematology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Nutrition and Food</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Nutrition Science</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Philosophy</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Physical Education</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Physics</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Political Science</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Psychology</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Religious Studies</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Rhetoric and Communication</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Russian</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Statistics</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Textiles and Clothing</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>War-Peace Studies</td>
<td></td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Women's Studies</td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
</tr>
</tbody>
</table>

College of Agricultural & Environmental Sciences or Letters & Science

College of Letters & Science
UC DAVIS

With 5,200 acres, UC Davis ranks first in physical size of the nine campuses of the University of California. It's also one of the nation's top 20 universities in research funding and has 24 undergraduate programs rated among the country's top 10, including the No. 1 botany department. What does this mean to you as a student? It means that the University's reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. Creative teaching and academic innovation are encouraged by several programs, including the $25,000 prize for Teaching and Scholarly Achievement, believed to be the largest award of its kind in the country.

The teaching faculty of 1700 is also supported by campus resources such as the Teaching Resources Center, which helps professors and teaching assistants sharpen their teaching skills, and the Learning Skills Center, which assists faculty in preparing classroom materials. Constructive criticism is provided by the Student Viewpoint: an evaluation of classes and instructors which is compiled each year from course questionnaires completed by students. Additional academic resources include laboratories; natural reserves; institutes; and centers for research, teaching, or service to students, faculty, or the community.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. Undergraduate enrollment is close to 17,500 students. Graduate Studies administers graduate study and research at all schools and colleges. Professional studies are carried on at the schools of Law, Management, Medicine, and Veterinary Medicine. Approximately 5,400 students are engaged in graduate or professional study.

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: Folsom Lake, Clear Lake, Lake Berryessa, the Napa and Sonoma valleys, and the historic Mother Lode country. The Sierra Nevada mountains, Lake Tahoe ski resorts, and coastal areas of Mendocino and Monterey are about 150 miles from Davis.

If you prefer the vibrant pulse of city life, Sacramento, the state capital, is only 15 miles to the east; and San Francisco is just 72 miles to the southwest. Both cities offer the symphony, the ballet, sporting events, theater, shopping, and other entertainment.

For long distance travel, the city 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 person 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. On some summer days, the thermometer can exceed 100 degrees, but overnight temperatures generally drop back into the fifties. Spring and fall weather is among 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 distinguishes 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 comprise nearly half of the city's population of 50,000, 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, Comic Opera Company, 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 20 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, country atmosphere, with plenty of open spaces, trees, and lawns. Even as the student population grows, the campus manages to maintain its informal, friendly ambiance.

Underlying the casual style of Davis students, however, is 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.

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

The University Farm

Davis was founded in 1905 as a "University Farm" where students from the first UC campus in Berkeley learned the latest in agricultural methods and technology. This beginning gained Davis students their nickname as "Cal Aggies." As the state's population grew, so did demand for higher education, and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was awarded to students completing the Davis program. A few years later, the Davis campus had its own College of Agriculture.

In 1948 California's only School of Veterinary Medicine was established at Davis. The College of Letters and Sci-
PRINCIPLES OF COMMUNITY

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

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

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

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

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

*The “Principles of Community” were prepared and adopted after extensive discussion within the campus community about the need for a statement which 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 UCDMC Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.*
ence was founded in 1951, bringing degree programs in the humanities to add to the campus' strong scientific foundation. By 1959, Davis had expanded enough to be declared a general campus of the University by the Regents, and the campus continued to grow. The College of Engineering came into being in 1962. The School of Law held its first classes in the fall of 1966, and the School of Medicine admitted its first students in the fall of 1968. Davis' newest addition, the Graduate School of Management, opened its doors in 1981.

From its beginning as a 778-acre teaching farm, UC Davis has grown and diversified, establishing an international reputation for teaching and research.

**THE UNIVERSITY OF CALIFORNIA**

The University of California began in 1868, when Governor Henry H. Haight signed the Organic Act, thus providing for California's first "complete University." Classes began the following year at the College of California in Oakland. The first buildings on the Berkeley campus were completed in 1873, and the University moved into its new home. The following June, the University of California conferred bachelor's degrees on 12 graduates.

Today the University is one of the largest and most renowned centers of higher education in the world. Its nine campuses span the state, from Davis in the north to San Diego in the south. In between are the Berkeley, San Francisco, Santa Cruz, Santa Barbara, Riverside, Irvine, and Los Angeles campuses.

All the campuses adhere to the same admission guidelines and high academic standards, yet each has its own distinct character, atmosphere, and academic individuality. Together, the nine campuses have an enrollment of almost 166,000 students, 90 percent of them California residents.

Some 150 laboratories, extension centers, and research and field stations strengthen teaching and research while providing public service to California and the nation. The collections of the more than 100 UC campus libraries are surpassed in size in the United States only by the Library of Congress collection.

The faculty of the University of California is internationally known for its distinguished academic achievements. On its nine campuses, the University has 18 Nobel laureates, and membership in the National Academy of Sciences is the largest of any university in the country. In 1992-93, 37 faculty from within the University were named American Fulbright Scholars.

**VISITING THE CAMPUS**

You may wish to arrange a visit to UC Davis sometime before you apply. If you have specific questions about application procedures or entrance requirements, it is a good idea to write or visit the Undergraduate Admissions Office. For individual or group weekday tours of the campus, contact the Information Services Office at least four or five days in advance. Weekend tours depart from the Buehler Alumni and Visitors Center at 11:30 a.m. and 1:30 p.m. No appointment is necessary.

Information: Information Services Office, Buehler Alumni and Visitors Center, 916-752-8111
human health and well-being. Through a vast 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.

Students are brought into early contact with faculty, advisers, graduate students and post-graduate researchers. A symbiotic relationship is developed in which undergraduate students bring new perspectives and join in the excitement of discovery. This enriches and broadens the educational experience of all.

Available to students are several levels of academic advising designed to enhance the student's undergraduate experience. Advisers assist students in course planning, meeting degree requirements and in taking maximum advantage of the resources available at the University. Students are encouraged to meet regularly with their assigned faculty adviser and with the Advising Associates and peer advisers housed in departmental offices. 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.

Information: College Office, 228 Mrak Hall, 916-752-0108

The College of Engineering

The College of Engineering has a tradition of excellence in instruction, research, and in public service. With an undergraduate enrollment of approximately 2,200 and a graduate enrollment of 600, the College can offer both a friendly atmosphere and the varied academic programs in basic sciences and engineering that have made UCD engineering graduates highly valued in industry and research.

The College has several departments; each has outstanding programs of instruction. 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 Applied Science instructs engineering graduate students in broad areas of scientific technology. The Department of Chemical Engineering offers a curriculum integrating an effective knowledge of chemistry with engineering sciences to enable students to solve problems in both current and future product technologies. Devoted to the improvement of the human environment to make our activities and surroundings more productive, safe, enjoyable, and aesthetic, the Department of Civil and Environmental Engineering trains students to plan and design systems that have a direct impact on the health and quality of human life. The Department of Electrical Engineering and Computer Science 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, Aeronautical, and Materials Engineering educates students to design and manufacture complex engineering systems for transport, industry, or energy; to design, manufacture, and operate aircraft and aeronautical structures; or to analyze the structure, properties, and behaviors of materials.

Every effort has been made to provide students in engineering with the maximum flexibility consistent with rigorous educational standards. The key to flexibility is academic advising. Incoming students are assigned to a faculty adviser before their first term on campus and usually retain the same adviser throughout their college careers. Faculty advising is supplemented by a well-developed peer advising system and by staff advising in the Dean's Office and in many departments.

Undergraduate education in engineering at Davis is intended to serve as a sound basis for beginning professional practice in engineering design and development, as a general 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 the student the maximum postgraduate flexibility. Technological developments in recent years have made it clear that engineering education must be based on fundamentals or become obsolete.
The College of Letters and Science

The College of Letters and Science is the largest of the three undergraduate colleges at UCD Davis. Through its more than 600 faculty members, the College offers over fifty major programs of study and thousands of courses per year in the fine arts, humanities, life sciences, physical sciences, social sciences, and mathematical 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 orientated training. The College seeks to expose students to the worlds of human experience, of ideas, of artistic accomplishments, and of matter and things. Although separate and distinct to the casual observer, these realms are interconnected and may be studied in a coherent curriculum. It is within this curriculum that students 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, students will be able to continue the on-going process of education that begins in the classroom but continues over a lifetime. They 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 is designed to ensure that students are well versed in the skills of written communication.

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

The Major Requirements are designed to provide students intellectual depth and competence in a selected area of study.

The College of Letters and Science recognizes and affirms the importance of perceptive and knowledgeable academic advising. 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 ranging from the Dean's Office to departmental offices to campus residence halls.

Woven throughout the tapestry of diversity that is the College of Letters and Science is a fundamental and unswerving commitment to excellence. The faculty of the College are dedicated 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 pursue these goals with enthusiasm and excitement.

ACADEMIC RESOURCES

Central Support

The University Library

The General Library at the University of California, Davis, is composed of the Peter J. Shields Library, the Physical Sciences Library, the Loren D. Carlson Health Sciences Library, the Agricultural Economics Library, and the library at the UCD Medical Center in Sacramento. A number of specialized departmental libraries are located on the campus, and the Law Library is located at the King Hall Law School.

The libraries contain over 2.5 million volumes and receive about 51,000 periodical and journal titles annually. Shields Library houses the collections in the
humanities, arts, social sciences, biological sciences, agricultural sciences, and mathematics. The collections of the Physical Sciences Library support teaching and research in engineering, computer sciences, and physical sciences. The library maintains a collection of one million research reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 228,000 volumes. The Agricultural Economics Library holds more than 7,500 bound volumes and 244,000 unabound pamphlets in this field. The library at the UCD Medical Center provides a clinical collection of 22,000 volumes.

Information: Library Administration Office, Shields Library, 916-752-6561

Information Technology

Information Technology (IT) provides a range of computing, communications, and media services in support of research and instruction. A central Campus Access Point (752-2548) offers information and consulting on all aspects of information technology use at UC Davis. IT also provides academic access to microcomputing, workstation computing, and supercomputing (at various sites nationally). Students have access to media production equipment and to taped lectures and slides/tape programs at media resource centers. Microcomputer labs, both PC and Macintosh, are available for student use, and Student Easy Access (EZ) accounts allow students to use network services including electronic mail and file transfer, and to computing on the UNIX and VMS operating systems available for academic use. EZ accounts are pre-allocated to all registered students, and can be activated by request at the Campus Access Point.

Information: 1450 Surge II, 916-752-2548; e-mail: ithelp@ucdavis.edu

University Arboretum

The 150-acre University Arboretum, located along Putah Creek's historic north fork, maintains a large collection of dry-land trees and shrubs for use in teaching and research. Outstanding plant collections include the Shields Oak Grove, the Mary Watts Brown Garden of California native trees and shrubs, the Ruth Storer Garden of drought-tolerant flowering perennials, and the T. Elliot Weier Redwood Grove. The Arboretum program of seed exchange is 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, and Geographic Information Systems (GIS).

Information: Arboretum Headquarters, 916-752-2498

Agricultural and Environmental Sciences

Agricultural History Center

The center coordinates and administers several research and publication programs designed to further the study of agricultural history. Primary research activities include studies of comparative farm policy, the history of farm land values, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the nineteenth and twentieth centuries, and the impact of scientific research.

Information: 378 Voorhies Hall, 916-752-1827

California Agricultural Experiment Station

The California Agricultural Experiment Station has branches in Davis, Riverside, and Berkeley. The Davis branch includes 500 faculty in over 30 departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine. In addition to lab 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. Research emphasis is placed on resource conservation and management, water and soil pollution, and regional planning.

Information: College of Agricultural and Environmental Sciences, 916-752-1610

Institute of Ecology

The Institute of Ecology has a campuswide responsibility to foster ecological and environmental research, provide intellectual leadership in ecology, administer resources and facilities, provide information on extramural support of ecological research, and maintain liaisons with governmental and private organizations interested in funding ecological and environmental research, or requiring advice on these subjects. The Ecology Institute has a publication series and sponsors national and international activities, including organizing symposia and conferences.

Information: 2132 Wickson Hall, 916-752-3026

Institute of Toxicology and Environmental Health (ITEH)

ITEH coordinates interdisciplinary research on biomedical and toxicological problems related to exposure to chemical, physical, and biological agents or to ionizing radiation. Studies on radioactive, mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, and inhalation toxicology. The institute houses a major Universitywide program in human epidemiology and occupational health.

Information: Institute of Toxicology and Environmental Health, 916-752-1340

J.M. Tucker Herbarium

The J. M. Tucker Herbarium is used for research in plant systematics and ecology, and for handling public service requests. The herbarium contains more than 115,000 vascular plant specimens. It also houses 30,000 specimens of the Beecher Crampton Herbarium Collection of grasses and other range plants. Smaller teaching herbaria are located in various plant science departments on campus.

Information: Section of Plant Biology, 916-752-1091
**Jepson Prairie Reserve**

The Jepson Prairie Reserve is used to study the effects of long-term grazing, to conduct fire ecology research, and to aid in management of native grasslands. The reserve is located fifteen miles south of the campus and comprises 1,666 acres of perennial bunchgrass grassland and vernal pools. The Jepson Prairie area is typical of habitats that once covered most of California's Central Valley and is recognized as the best remnant of native prairie land. Several rare or endangered species are endemic to the area.

Information: Institute of Ecology, 2127 Wickson Hall, 916-752-6949

**Mann Laboratory**

Mann Laboratory researchers study the physiology, biochemistry, and molecular biology of harvested vegetables. They train students, and disseminate information about postharvest biology and technology to growers, shippers, marketers, and consumers. The facility is part of the Department of Vegetable Crops, houses six faculty, and is equipped with 16 controlled-temperature rooms, seven research laboratories, a teaching laboratory, and a library/conference room.

Information: 113 Mann Laboratory, 916-752-1410

**Putah Creek Campus Reserve**

The goals of the Putah Creek Campus Reserve are habitat conservation, education, research, and environmentally directed recreation. The reserve consists of a 150-acre corridor along the north bank of Putah Creek with a remnant of the riparian (streamside) ecosystem that once covered much of the Sacramento Valley. It is an excellent wildlife observation area. A mini-grants program through the Office of Research supports student projects.

Information: 916-752-6949

**Water Resources Center**

The center supports selected research in such areas as agricultural sciences, biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences, and political science. Research interests include drought response, 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, soil and land use management in relation to water resources use, and maintenance and improvement of water quality.

Information: University Extension Building, 916-752-9901

**Stebbins Cold Canyon Reserve**

Terrain and rainfall patterns of the Cold Canyon area support examples of several different plant communities found in both the inner and outer coast ranges. The diversity of plant and animal species on the reserve, and its close proximity to the campus, contribute to the popularity of the reserve as an open-air classroom and research site. The 576-acre reserve is located 24 miles west of campus near Lake Berryessa and is available for teaching and field research by scientists and students.

Information: Department of Avian Sciences, 3202 Meyer Hall, 916-752-1300

**Sustainable Agriculture Program: Student Experimental Farm**

The Student Experimental Farm is an innovative teaching and research facility located on 25 acres of University land, and is the main focus of the Sustainable Agriculture Program. 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 over a decade, it provides researchers with a facility for conducting field research into sustainable agriculture.

Information: Student Experimental Farm, 916-752-7645

**UC Agricultural Issues Center**

The UC Agricultural Issues Center, headquartered at Davis, is a Universitywide research and outreach unit that draws on expertise from many disciplines. The center is particularly interested in issues such as the impacts of demographic change on agriculture, natural resources, and rural life in California; social, economic, and environmental effects of agricultural technologies; food consumption and international agriculture; and local and national policies that affect Western agriculture and its workers.

Information: 110 University House, 916-752-2320

**Biological and Life Sciences**

**Adult Fitness Program**

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 are conducted in the areas of cardiovascular, respiratory, and metabolic functions. The program emphasizes risk reduction for cardiovascular disease and development of cardio-respiratory endurance. Studies stress fitness, relaxation, and weight reduction and control through appropriate diet and exercise programs which are individually prescribed after extensive medical and physiological testing.

Information: Department of Physical Education, 916-752-2340

**Bodega Marine Laboratory and Reserve**

The Bodega Marine Laboratory is an organized research unit 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 contain running seawater to two classrooms and most laboratories, a marine science library, greenhouses, aviary, experimental freshwater system for anadromous fish studies, and a dive locker and air station. A number of undergraduate courses are taught during the academic year and summer session. The laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis.

The Bodega Marine Reserve, part of the UC Natural Reserve System, is 362 acres of Remarkably diverse habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh,
coastal prairie, and dunes. Adjacent subtidal sand and rock habitats in a Marine Life Refuge are administered as part of the reserve. Current areas of research include population biology of shorebirds, marine invertebrates, fishes, and coastal plants; plant-insect interactions; subtidal biomechanics; and other topics.

Information: Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, CA 94923, 707-875-2211

**California Regional Primate Research Center (CRPRC)**

The research staff of 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 biology, genetic and reproductive biology, respiratory diseases, virology and immunology, comparative primate biology, and a variety of biomedical collaborative research projects. A major theme of the CRPRC is the study of environmental influences on nonhuman primates and the identification of spontaneously occurring disorders.

Information: Primate Center, 916-752-0447

**Food Intake Laboratory**

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

Information: TB 33, 916-752-7516

**Health Sciences Research Labs**

The Health Sciences Research Laboratories are composed of several high technology biological science facilities with research staff and assistance for faculty, staff, and students. These include:

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

  Information: Buildings H and J—ARS, 916-752-7756

- **Biochemistry and Special Instrumentation Laboratory**—a central facility providing investigators access to certain common but expensive laboratory equipment. Equipment includes ultracentrifuges and high speed centrifuges with rotors, scintillation and gamma counters, UV/MS spectrophotometers, densitometers, Betaplate and Elisa readers.

  Information: TB 161, 916-752-3166

- **Protein Structure Laboratory**—provides instrumentation for protein sequencing and for amino acid, protein and DNA synthesis. Also available are a microbore HPLC for high sensitivity peptide mapping and a preparative HPLC for large scale purification.

  Information: 1145 Surge 1, 916-752-6226

**Human Performance Laboratory**

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, cardiorespiratory function during exercise in a controlled environment, control and acquisition of motor skills, and the psychosocial aspects of human performance. Apple Macintosh and IBM microcomputers are located within the laboratory and can be used for data collection, reduction, graphing, and statistical analysis as well as for biomechanical, physiological systems, and human performance modeling.

Information: 164 Hickey Gym, 916-752-0965
Institute of Marine Resources

The marine food science component of this statewide institute is part of the Department of Food Science and Technology at Davis. The staff studies factors affecting the chemical, biochemical, microbiological, and nutritional properties of fish and other seafood. Current studies include those dealing with comparative biochemistry of proteolytic enzymes, the use of modified atmospheres for storage of seafood products, crustacea nutrition, carotenoprotein extraction as part of a project dealing with shellfish waste, and extracellular enzyme processing and production by a hydrogen-utilizing yeast.

Information: Temporary Building 186, 916-752-2506

Veterinary Genetics Laboratory

The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities in the Veterinary Genetics Laboratory include: investigation of red cell, serum, DNA genetic markers which enhance the effectiveness of current techniques applied to parentage investigation and identification of cattle, horses, sheep, goats, llamas, and dogs; study of breed relationships through gene frequency analysis; gene mapping; investigation of the mode of inheritance of several suspected hereditary diseases; and karyotyping for diagnosis of clinical diseases.

Information: Horse Bloodtyping Laboratory, Armstrong Tract, 916-752-2211; Cattle Bloodtyping Laboratory, Armstrong Tract, 516-752-7383

Veterinary Medicine Teaching and Research Center (VMTRC)

VMTRC is a clinical teaching and research center within the UCD School of Veterinary Medicine. The center offers a forum for teaching, research, and service programs for DVM students, MPVM students, graduate students, food animal 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, and food safety.

Information: UCD VMTRC, 18830 Road 112, Tulare, California 93274, 209-688-1713

Engineering and Physical Sciences

Crocker Nuclear Laboratory

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, activation analysis, biology, neutron damage studies, and the affect 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.

Information: Crocker Nuclear Laboratory, 916-752-1460

Center for Geotechnical Modeling

At the Center for Geotechnical Modeling, research in physical and numerical modeling is conducted by faculty and students from several departments and campuses of the University. The center operates two small centrifuges and the large National Geotechnical Cen- trifuge. These centrifuges are used for research on geotechnical problems such as the effect of earthquakes on earth structures, toxic waste transport, and foundations of large buildings.

Information: 206 Walker Hall, 916-752-6986

Facility for Advanced Instrumentation

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 adjacent to a specimen preparation laboratory. Morphometric analysis is supported by a computerized digitizing tablet and digitizing video image analysis computer. A mass spectrometer laboratory consists of a quadrupole mass spectrometer and a high resolution double-focusing instrument. The facility also coordinates access to additional instruments located in other departments around the campus.

Information: Hutchison Hall, 916-752-0284

Institute of Theoretical Dynamics

The institute is an organized research unit promoting research and graduate education in the mathematical sciences. The institute 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 the activities of the institute, which include 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. Three core research areas are currently supported: mathematical biology, mathematical physics, and applied mathematical analysis, especially fluid dynamics. The institute houses the NSF Computer Graphics Facility for computational biology, which is open to faculty, graduate students and post-doctoral researchers for graphic visualization in biology.

Information: Academic Surge Building, 916-752-0936

Intercampus Institute for Research at Particle Accelerators

This institute conducts research that uses the unique facilities at national and international accelerator laboratories, particularly the Stanford Linear Accelerator Center, the European Fermi National Accelerator Laboratory, the Japanese accelerator laboratory (KEK), and the German laboratory (DESY) in Hamburg. High-energy particle physics is the dominant area of research. The institute also promotes seminars and lectures by visiting researchers at individual campuses.

Information: Professor Richard L. Lander, Associate Director, 325 Physics/Geology Building, 916-752-1780

Nuclear Magnetic Resonance Facility

The Nuclear Magnetic Resonance Facility provides researchers with direct access to high resolution 500 MHz and 300 MHz General Electric spectrometers. Experts in NMR are available to advise and assist in the application of NMR to problems in chemistry, biochemistry and molecular biology. For the study of animals and materials, a 1.9 Tesla spectrometer with a horizontal bore of 200 mm is available to obtain localized
spectra and magnetic resonance images. A 7 Tesla spectrometer for both in vivo NMR and magnetic resonance imaging is also available.

Information: Med Sci 1D, 916-752-7677

X-Ray Crystallographic Facility

The X-Ray Crystallographic Facility is located in the Department of Chemistry. There are three automated four-circle diffractometers. One of these has a Siemens area detector and is used with an 18 kW rotating anode X-ray source, making it suitable for biocrystallography. There are also traditional Weissenberg and precession cameras. All diffraction equipment is fitted with low-temperature (liquid N₂) attachments. In addition, the facility contains 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.

Information: Department of Chemistry, 916-752-6668

Humanities and Social Sciences

Early Childhood Laboratory

The Early Childhood Laboratory is a teaching and research facility of the Division of Human Development and Family Studies. The laboratory provides a facility where students enrolled in human development courses develop observational techniques and participate with peers, children, parents, and professionals in a fully integrated early childhood program. The facility helps students link theory and practice, develop a recognition and respect for individual differences, and consider their interaction and communication styles. Selected graduate students and faculty also conduct research at the laboratory.

Information: West-House of Early Childhood Laboratory, 916-752-2888

Humanities Institute

The Davis Humanities Institute organizes interdisciplinary research seminars open to graduates and faculty, and seeks to promote creative exchanges between the humanities, social sciences, and environmental sciences. Its fellowship program enables campus fellows, visiting fellows, and distinguished visitors to spend time in residence at the institute, and to participate in year-long or quarter-long seminars on designated themes. The seminar theme for 1993-94 is Nature and Culture. In 1994-95, the theme will be Humanities, Science, and Technology. The institute also co-sponsors lectures with other departments; organizes a Friday noon series of talks and films entitled "Problems and Paradigms;" produces a weekly calendar of events; and publishes a quarterly newsletter, Humanities at Davis.

Information: 508 Second Street, Suite 202, Davis, CA 95616-8613, 916-757-3470, FAX: 916-756-2876

Institute of Governmental Affairs

The Institute of Governmental Affairs (IGA) serves as a center for advanced social science research. IGA offers research opportunities for faculty, undergraduate and graduate students, as well as for visiting scholars from throughout the United States and around the world. The institute houses two centers: the Center for Regulation and Deregulation and the Center for State and Local Taxation. In addition, IGA sponsors five research programs: Labor and Immigration Policies; Pacific Rim Studies; Government and Politics; East Asian Business and Development; and Applied Public Policy. The institute also supports a wide range of public affairs programs, seminars, and conferences designed to foster debate on political, economic, and social issues. IGA provides specialized library services and oversees the Social Science Data Service.

Information: Shields Library, 916-752-2042

Social Science Data Service

The Social Science Data Service provides assistance to students and faculty interested in quantitative research involving the use of the computer. The facility offers consultation on statistical packages, database management, survey and database development, and data archives.

Information: 161 AOB 4, 916-752-6063
Application Filing Periods

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

<table>
<thead>
<tr>
<th>Quarter of Attendance</th>
<th>Filing Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall quarter 1993</td>
<td>November 1-30, 1992</td>
</tr>
<tr>
<td>Winter quarter 1994</td>
<td>July 1-31, 1993</td>
</tr>
<tr>
<td>Spring quarter 1994</td>
<td>October 1-31, 1993</td>
</tr>
<tr>
<td>Fall quarter 1994</td>
<td>November 1-30, 1993</td>
</tr>
</tbody>
</table>

Submit your completed application form to:

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

Winter and spring quarters may require that you submit the application directly to the Davis campus. Please call Undergraduate Admissions during the winter and spring filing periods to find out where to mail your application.

Application Fees

The basic application fee to apply to one campus of the University is $40. For each additional campus you select, you must pay an extra $40 fee. These fees are not refundable. Attach a check or money order made payable to the Regents of the University of California to the application form.

PREPARING FOR UNIVERSITY WORK

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—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, one year of history, 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: a) understand the assigned topic; b) select and develop a theme by analysis and argument; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that economically and successfully convey the writer’s ideas and display a variety of structures; and e) 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 for which mathematics is a prerequisite.

Finally, take advantage of any guidance your high school offers in study skills, and diagnostic tests designed to assist you in assessing your college preparation. 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 vary for California residents and 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.

Requirements for California Residents

To be eligible for admission to the University of California as a freshman, you must meet 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 7 of the required 15 units will have been 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 ninth 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 ninth-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—1 year (starting fall 1994—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. (Starting fall 1994, one year of world history, cultures, geography also will be required.)

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 ninth grade. (See English Proficiency below.)

C. Mathematics—3 years

Three years of mathematics—elementary algebra, geometry, and intermediate algebra. (Courses taken in grades seven and eight may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

D. Laboratory Science—1 year (starting fall 1994—2 years)

A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade. (Starting fall 1994, two years from at least two of these three areas: biology, chemistry, and physics. One course may be taken in the 9th grade.)

E. Language other than English—2 years

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 seven and eight may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. College Preparatory Electives—4 years (starting fall 1994—2 years)

Four years in addition to those required in “A” through “E” above, to be chosen from at least two of the following subject areas.

- History and English: courses that fit the general description for elective courses above.
- Advanced mathematics: trigonometry, linear algebra, precalculus (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 nine 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 fit the general description for elective courses above, and 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 students 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 placed on file with the University’s Office of Student Academic Services. If you submit courses from an out-of-state school, the Undergraduate Admissions Office 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:

- College Board Achievement Test in English Composition (a score of 600 or above); or
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, or 3); or
- California State University and Colleges English Equivalency Test (a "pass for credit" only).

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

An applicant must have earned a grade of C or better in all high school courses to satisfy the "A" through "E" requirements above. The grades earned in these courses that are taken in grades ten through twelve will be used to evaluate the grade-point average for minimum eligibility.

If you attain a grade-point average of 3.30 [where the letter grade A=4, B=3, and C=2, and in university-approved honors or advanced placement courses taken during the tenth, eleventh and twelfth 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 ninth 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 ninth 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.

Examination Requirement

All freshman applicants must submit 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 Aptitude Test (College Board)—The verbal and mathematics tests scores you submit must be from the same sitting
  or
- American College Test

AND

- Three Achievement Tests (College Board), which must include (a) English Composition (with or without the essay), (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.

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).

<table>
<thead>
<tr>
<th>Eligibility Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Grade Point Averages</strong></td>
</tr>
<tr>
<td><strong>A-F Requirement</strong></td>
</tr>
<tr>
<td>2.82</td>
</tr>
<tr>
<td>2.83</td>
</tr>
<tr>
<td>2.84</td>
</tr>
<tr>
<td>2.85</td>
</tr>
<tr>
<td>2.86</td>
</tr>
<tr>
<td>2.87</td>
</tr>
<tr>
<td>2.88</td>
</tr>
<tr>
<td>2.89</td>
</tr>
<tr>
<td>2.90</td>
</tr>
<tr>
<td>2.91</td>
</tr>
<tr>
<td>2.92</td>
</tr>
<tr>
<td>2.93</td>
</tr>
<tr>
<td>2.94</td>
</tr>
<tr>
<td>2.95</td>
</tr>
<tr>
<td>2.96</td>
</tr>
<tr>
<td>2.97</td>
</tr>
<tr>
<td>2.98</td>
</tr>
<tr>
<td>2.99</td>
</tr>
<tr>
<td>3.00</td>
</tr>
<tr>
<td>3.01</td>
</tr>
<tr>
<td>3.02</td>
</tr>
<tr>
<td>3.03</td>
</tr>
<tr>
<td>3.04</td>
</tr>
<tr>
<td>3.05</td>
</tr>
<tr>
<td>3.06</td>
</tr>
<tr>
<td>3.07</td>
</tr>
<tr>
<td>3.08</td>
</tr>
<tr>
<td>3.09</td>
</tr>
<tr>
<td>3.10</td>
</tr>
<tr>
<td>3.11</td>
</tr>
<tr>
<td>3.12</td>
</tr>
<tr>
<td>3.13</td>
</tr>
<tr>
<td>3.14</td>
</tr>
<tr>
<td>3.15</td>
</tr>
<tr>
<td>3.16</td>
</tr>
<tr>
<td>3.17</td>
</tr>
<tr>
<td>3.18</td>
</tr>
<tr>
<td>3.19</td>
</tr>
<tr>
<td>3.20</td>
</tr>
<tr>
<td>3.21</td>
</tr>
<tr>
<td>3.22</td>
</tr>
<tr>
<td>3.23</td>
</tr>
<tr>
<td>3.24</td>
</tr>
<tr>
<td>3.25</td>
</tr>
<tr>
<td>3.26</td>
</tr>
<tr>
<td>3.27</td>
</tr>
<tr>
<td>3.28</td>
</tr>
<tr>
<td>3.29</td>
</tr>
</tbody>
</table>

*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.
†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.
**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), and how those units will be applied toward specific degree requirements (see the column headed: Credit Allowed Toward Specific Degree Requirements). 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 UCD General Education Requirement. Rather, AP credits are counted as transfer credits and may reduce the number of General Education (GE) courses you have to complete. (See GE section in Bachelor’s Degree Requirements 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 UCD 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.

**Minimum Requirements for California Residents**

Transfer applicants must meet one of the following conditions:

- If you were eligible for admission to the University when you graduated from high school—meaning you satisfied the subject, scholarship, and examination requirements—you are minimally eligible for admission if you have a C (2.0) average in your transferable college course work.

If you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen. All transfer
## College Board Advanced Placement (AP) Examination Credit

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
<th>CREDIT TOWARD DEGREE</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGLISH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>5, 4</td>
<td>English A, 1, 3</td>
<td>8 units</td>
<td></td>
<td>English/ Humanities Credit 8 units (College of Agricultural and Environmental Sciences)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>English A</td>
<td>8 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FOREIGN LANGUAGES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>5</td>
<td>French 22</td>
<td>French 23,</td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives</td>
</tr>
<tr>
<td>French</td>
<td>4</td>
<td>French 21</td>
<td>French 23,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>3</td>
<td>French 3</td>
<td>French 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germain</td>
<td>5, 4</td>
<td>German 4</td>
<td>German 101,</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>3</td>
<td>German 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin (Vergil)</td>
<td>5, 4</td>
<td>Latin 2</td>
<td></td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Latin (Lyric)</td>
<td>5, 4</td>
<td>Latin 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4</td>
<td>Spanish 21 or 22</td>
<td>English Composition</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>3</td>
<td>Spanish 3</td>
<td>English Composition</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HUMANITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>Art Studio 2, 5</td>
<td>2 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art Studio</td>
<td>4</td>
<td>Art Studio 2</td>
<td>2 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art History</td>
<td>3</td>
<td>Art History 1A, 1B, 1C</td>
<td>8 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art History</td>
<td>4, 3</td>
<td>Art History 17A, 17B</td>
<td>8 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European History</td>
<td>5, 4</td>
<td>History 4B, 4C</td>
<td>8 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>5, 4</td>
<td>Music 10</td>
<td>4 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NATURAL SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>5, 4, 3</td>
<td>Biological Sciences 10</td>
<td>8 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>Chemistry 2A</td>
<td>Determined by consultation with adviser</td>
<td>8 units</td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4</td>
<td>Chemistry 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>5, 4</td>
<td>Computer Science Engineering 30</td>
<td>Computer Science Engineering 40</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>3</td>
<td>Computer Science Engineering 30</td>
<td></td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>5, 4, 3</td>
<td>Computer Science Engineering 30</td>
<td></td>
<td>2 units</td>
<td></td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4</td>
<td>Mathematics 12, 16A, or 21A</td>
<td>Mathematics 16B or 21B</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>3</td>
<td>Mathematics 12, 16A-16B, or 21A-21B</td>
<td>Mathematics 16C or 21C</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>4, 3</td>
<td>Mathematics 12, 16A, or 21A</td>
<td>Mathematics 16B or 21B</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics B</td>
<td>5, 4, 3</td>
<td>Physics 1A, 1B, 5A, 5B, 3C, 10</td>
<td>Determined by consultation with adviser</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 3</td>
<td>Physics 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics C</td>
<td>5</td>
<td>Physics 1A, 5A, or 9A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics C</td>
<td>4</td>
<td>Physics 1A or 5A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics C</td>
<td>3</td>
<td>Physics 1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics C</td>
<td>5, 4</td>
<td>Physics 1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics C</td>
<td>3</td>
<td>Physics 1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SOCIAL SCIENCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 1</td>
<td>4 units</td>
<td>Social Science Credit/Unrestricted Electives</td>
<td></td>
</tr>
<tr>
<td>Comparative Government and Politics</td>
<td>5, 4, 3</td>
<td>Political Science 2</td>
<td>4 units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics (Micro)</td>
<td>5, 4, 3</td>
<td>Economics 1A</td>
<td>Determined by consultation with Economics adviser</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Economics (Macro)</td>
<td>5, 4, 3</td>
<td>Economics 1B</td>
<td>Determined by consultation with Economics adviser</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>5</td>
<td>Psychology 1, or 15-16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Humanities Credit/Unrestricted Electives**
- 4 units: For each foreign language examination passed.
- In the College of Agricultural and Environmental Sciences, satisfies credit toward breadth/Unrestricted electives.
- In the College of Letters and Science, examinations (except for Latin) satisfy the Foreign Language requirement.
- In the College of Engineering, 4 units toward Humanities/Social Science electives.

**Humanities Credit/Unrestricted electives**
- 6 units: In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.
- 8 units: In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.
- 8 units: In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.
- 8 units: In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.
- 8 units: Satisfies American History and Institutions requirement. History 17A, 17B, and 17C may be taken for full credit.
- 8 units: History 4A and 4B may be taken for full credit.
- 8 units: In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.

**Natural Sciences Credit/Preparatory Courses for Science Majors**
- 4 units: Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.
- 8 units: Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2HA, 2HB, 2HC sequence.
- 8 units: Credit for Computer Science Engineering 30 may serve as a prerequisite for Computer Science Engineering 40 with consent of instructor.
- 8 units: In the College of Engineering awards units towards the unrestricted electives requirement.

**Social Science Credit/Unrestricted Electives**
- 4 units: Political Science 1 satisfies American History and Institutions requirement.
- 4 units: In College of Agricultural and Environmental Sciences, satisfies credit toward breadth requirement or Unrestricted electives.
- 4 units: In College of Engineering, awards credit toward Humanities-Social Sciences electives requisition.
students, regardless of the date of high school graduation, must meet the high school requirements stated earlier in this catalog, or establish eligibility as junior-level transfers.

- If you have graduated from high school and meet the needed scholarship and examination requirements but you have not completed one or more of the "A to F" subjects while in high school, you will be minimally eligible to be considered for admission after you have:
  1. established an overall grade-point average of 2.00 or better in another college or university;
  2. completed with a grade of C or better appropriate college courses in the high school subjects that you lack; and
  3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.

- If you did not meet the needed scholarship requirement or did not meet the scholarship requirement and lack the required subjects, you will be minimally eligible to be considered for admission after you have:
  1. completed 84 transferable quarter (56 semester) units of credit in college courses; and
  2. established an overall grade-point average of 2.40 or better in another college or university; and
  3. completed one of the following:
    a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit—one year-long course) of credit may be waived except in English and mathematics;
    or
    b. a college course, or courses, in mathematics; one transferable course in English; and one transferable course in either U.S. history, a laboratory science, or a language other than English, all with grades of C or better. The mathematics component may be satisfied in one of the following ways: a) take courses in algebra, geometry, and advanced algebra; b) take a course that employs the topics of advanced algebra—for example, college algebra, pre-calculus, calculus, linear algebra; c) take a a transferable statistics course that has advanced algebra as a prerequisite. Courses on the application of statistics to particular disciplines (i.e., business statistics) may not be used to satisfy this requirement.

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 2.8 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 84 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or better and have completed the subject requirements for California residents.

Transferring to the College of Engineering

If you are admitted with fewer than 84 quarter units of college work (56 semester units), you are classified in lower division standing, and must complete one of the four Lower Division Programs listed under Engineering in the Programs and Courses section of this catalog. You are advanced to upper division standing after completing 84 units.

When there are more applicants than space available in the College, priority is given to transfers from California community colleges who have completed the lower division program for engineering with a high grade-point average. You must select a major before admission, and once admitted, you may be limited in your freedom to change majors within the College.

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 the Undergraduate Admissions Office.

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 campus of the University of California and have not since been registered in another institution, you may apply for transfer to the Davis campus. Filing dates and application fees are the same as those listed for new applicants.

ADMISSION AS AN INTERNATIONAL STUDENT

International students attend the University of California, Davis from many countries in the world. An international application may be obtained by writing the Undergraduate Admissions Office, University of California, Davis, California, 95616. It is very important that the application be filed 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 for or 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 Aptitude Test (SAT) and Achievement Tests are required for international freshman applicants who are graduates of U.S. high schools or American-type schools abroad and for applicants from countries with educational systems 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, coursework is considered transferable if the applicant completed the course at an institution that is recognized by the University of California and is comparable to coursework offered at the University of California.

Most international students are required to complete a "Certification of Finances" form that attests to the student's ability to pay for non-resident tuition and fees and living expenses.

All international students who have not satisfied the Subject A requirement through domestic coursework or testing, or whose native language is not English, must take the Examination in English for Non-Native Speakers upon entrance to 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.

UC Davis welcomes competent, qualified applicants from around the world.

**CAMPUS SELECTION CRITERIA**

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

In recent years, the number of applicants for some majors has far exceeded 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 1993 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 the Undergraduate Admissions Office 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 the number required to meet their enrollment target admit students using the criteria described below.

**Freshman Applicants**

**Academic Criteria** (used to select 60% of admits): 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 or ACT and three required Achievement 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 40% of admits): Applicants are evaluated using the selection criteria described above in conjunction with the following supplemental criteria:

1. Personal accomplishments, talents, experiences, or interests that will contribute to the educational environment of the campus.

2. Special circumstances which may have affected the applicant’s life, including personal hardship, disabilities, economic disadvantage, and membership in groups historically underrepresented at the University.

Transfer Applicants

Academic Criteria: Top priority for admission consideration is given to UC-eligible California community college junior level transfer applicants. 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, environmental policy analysis and planning, international relations, and psychology, for example—the completion of specific lower division preparatory courses for the major is required. Contact Undergraduate Admissions 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 Admissions 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. Interquarter transfer, EOP, and readmission 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 should be returned by May 1 (as a freshman) or June 1 (as a transfer) to notify the campus that you wish to attend. Students admitted to winter or spring quarter must return the Statement of Intent to Register by the date specified in the notification of admission. Students not selected for admission consideration at the UC campuses to which they have applied may have their application considered at another UC campus where space is still available.

READMISSION

If you are a former UCD undergraduate student planning to return to UC Davis, you must file an Application for Readmission and pay a nonrefundable, nonrefundable fee of $40. This application is available in the Office of the Registrar. (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.

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

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deadline Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1993</td>
<td>August 27, 1993</td>
</tr>
<tr>
<td>Winter 1994</td>
<td>December 3, 1993</td>
</tr>
<tr>
<td>Spring 1994</td>
<td>March 4, 1994</td>
</tr>
<tr>
<td>Fall 1994</td>
<td>August 26, 1994</td>
</tr>
</tbody>
</table>

SPECIAL PROGRAMS

Concurrent Enrollment

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

For information, write the University Extension Office, Research Park, University of California, Davis, CA 95616, 916-757-8777.

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)

The Educational Opportunity Program/Student Affirmative Action assists students from ethnic groups that are underrepresented in the UC eligibility pool (American Indian, African-American, Chicano, and Latino) who are seeking an undergraduate education at UC Davis. Also, the program assists students with a disability and students from economically and/or educationally disadvantaged backgrounds. EOP/SAA can help you with the admission application process and offers academic, social, and financial support. (See also under the Academic Advising and Student Resources chapter.) An admission application fee waiver and financial aid are available to those individuals with demonstrated financial need. You can contact the Undergraduate Admissions Office for information on obtaining the fee waiver.

An EOP/SAA applicant may be admitted in one of these two ways: (1) as a freshman or advanced standing student who has met the standard admission requirements, or (2) as an admitted-by-exception student because the applicant has not met the admission requirements but has demonstrated strong academic potential.

To apply for the program, each applicant must complete the regular UC admission application form and complete the appropriate places related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required essay.
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. Fees and filing dates are the same as those for new applicants. 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 also submit transcripts from all schools attended. You will not be admitted to limited status for the purpose of raising a low scholarship average.

As a limited status student you will be expected to maintain a certain scholarship average during a predetermined time of enrollment.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer 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 College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer and the dean of the college.

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

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 Officer and are subject to approval by the dean of the college in which you plan to enroll. Admission is for a specified time only and a prescribed scholarship average must be maintained. 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. Obtain the undergraduate admissions packet from your high school, a community college, or a campus of the University of California. If you are not a California resident, request an application from the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, CA 95616.

☐ 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.

☐ 3. Keep a copy of your application and essay.

☐ 4. Retain for your records the notices received from both the Undergraduate Application Processing Service and the Undergraduate Admissions Offices which acknowledge receipt of your application.

☐ 5. If you are applying from high school, do not send a preliminary transcript unless requested to do so by Undergraduate Admissions. If you are applying as an advanced standing student, arrange to have all official transcripts sent. If test scores are required, please arrange to have these forwarded by the testing agency.

☐ 6. High school applicants to the fall quarter should take the SAT or ACT and three Achievement tests no later than December. We strongly encourage you to complete these tests by the November test date.

☐ 7. The Undergraduate Admissions Office may request additional information, such as transcripts, test scores, or confirmation of work in progress. Send this information right away so your application can be processed without delay. Note: Your eligibility for admission cannot be evaluated until all your application materials are received, i.e., application form, filing fee, essay, official transcript (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,” and Student Address form along with the nonrefundable advance deposit of $100 (if required), as soon as possible and no later than the date stated on the SIR so your registration materials can be ordered before you register.

☐ 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 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 aid well in advance of enrollment. The deadlines for financial aid (grants, loans, work-study, and scholarships) can be found in the following pages.

These are the proposed fees for the 1993-94 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.

At the time of registration each quarter, every student must pay the following fees (Effective fall quarter 1993, a Registration Fee Deferred Payment Plan will be implemented, which will allow students to pay their quarterly fees in three monthly installments):

**Undergraduate Student Fees**
- University Registration Fee: $231.00
- Memorial Union Fee: $28.50
- Associated Students Fee: $23.50
- Optional Undergraduate Health Insurance Fee: $145.00
- Educational Fee: $1042.00
- **Total for California residents**: $1,470.00
- Tuition for nonresidents: $2,566.00
- **Total for nonresidents**: $4,036.00

**Graduate Student Fees**
- University Registration Fee: $231.00
- Memorial Union Fee: $28.50
- Graduate Student Association Fee: $6.50
- Health Insurance Fee: $128.00
- Educational Fee: $1042.00
- **Total for California residents**: $1,436.00
- Tuition for nonresidents: $2,566.00
- **Total for nonresidents**: $4,002.00

**Important Fee Exceptions**

The Graduate Student Association fee is optional for students in the Schools of Law, Medicine, and Veterinary Medicine. (Law students are required to pay a Law Student Association fee of $8.00 per semester.)

Students approved for enrollment on a part-time basis are required to pay only one-half of the Educational Fee and one-half of the Nonresident Tuition Fee.

The Undergraduate Health Insurance plan is available to all undergraduates, except for foreign undergraduate students who must pay the Graduate Student Health Insurance Program Fee.

**Additional Fees and Expenses**

Students may be subject to the following fees for optional services (rates subject to change):

- Parking (per year): $60 to $276 for cars, depending on the type of permit; $108 for motorcycles; $108 for nighttime permit, i.e., $17 per quarter
- Bicycles, fee for the California State License (initial license, $6, and renewals, $3). Required for all bicycles on campus.

For details concerning fees and deposits, consult the publication 1993-94 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

---

**Costs for a Year at UC Davis**

The costs listed in the chart 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 obtained from the Financial Aid Office.

<table>
<thead>
<tr>
<th>Average Student Costs Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undergraduate</strong></td>
</tr>
<tr>
<td>Fees</td>
</tr>
<tr>
<td>Books and Supplies</td>
</tr>
<tr>
<td>Housing</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Personal Expenses</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td><strong>Total (off-campus residence)</strong></td>
</tr>
<tr>
<td>Additional for living on campus</td>
</tr>
<tr>
<td><strong>Total (on-campus residence)</strong></td>
</tr>
<tr>
<td><strong>Graduate (Single, living off campus)</strong></td>
</tr>
<tr>
<td>General</td>
</tr>
<tr>
<td>School of Law</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
<tr>
<td>Graduate School of Management</td>
</tr>
<tr>
<td>School of Medicine</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
<tr>
<td>School of Veterinary Medicine</td>
</tr>
<tr>
<td>(depending upon the year in school)</td>
</tr>
</tbody>
</table>

**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, and the Memorial Union Fee. Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Section 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services Office. Petitions can be obtained through the employee's unit.

**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 1993-94 academic year, we estimate the cost will be $23,500. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, $23,500 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 Certification of Finances form certifying that funds are available for twelve months support. It is very important that students have adequate, reliable, and contin-
using 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.

Cancellation, Withdrawal, and Fee Refunds

If you have to withdraw before the first day of instruction, you must complete a Cancellation of Registration form. This form is available from the Office of the Registrar. If you withdraw after the first day of instruction, you must fill out a Petition for Withdrawal, which is also available at the Office of the Registrar.

New Undergraduate Students:

Prior to Day 1, Registration fees paid are refunded in full except for the $100 acceptance of admission fee.

Day 1 and after, the $100 acceptance of admission fee is withheld from the registration fee and the Schedule of Refunds is applied to the balance of fees assessed.

All Continuing and Readmitted Students and New Graduate Students:

There is a service charge of $10 for cancellation of registration before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

Schedule of Refunds

The Schedule of Refunds refers to calendar days beginning with the first day of instruction. Percentages listed (days 1-35) should be applied respectively to tuition, education fee, university registration fee, and other student fees. The effective date for determining a refund of fees is the date the student files an official notice of withdrawal with the University, and it is presumed that no University services will be provided to the student after that date.

University registration fee, education fee, nonresident tuition and other student fees*:

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14</td>
<td>80%</td>
</tr>
<tr>
<td>15-21</td>
<td>60%</td>
</tr>
<tr>
<td>22-28</td>
<td>40%</td>
</tr>
<tr>
<td>29-35</td>
<td>20%</td>
</tr>
<tr>
<td>36 days and over</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Refund Schedule subject to change.

Refund of Health Insurance Fee

If you paid the health insurance fee and you are cancelling your registration 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 (916) 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
113 North Hall
916-752-2990 (TDD 752-3244)

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants, and work-study employment.

Financial Aid Deadlines

| Priority filing period for grants, loans, work-study, and California Student Aid |
| Commission applications for 1994-95 | Jan. 1-Mar. 2 |
| Deadline to file for fellowships and graduate scholarships for 1994-95 with Graduate Studies | Jan. 15 |

Students who miss the priority filing date may not receive funds to meet their full need. However, you should still apply for financial aid even after the priority deadline because application processing will continue until funds are depleted. 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 section for information about scholarship applications or contact the UC Davis Scholarship Office, 207 North Hall, 916-752-2393.

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 and demonstrate financial need and academic eligibility. The awards pay part of the cost of tuition and are based on undergraduate grades, test scores, parents' educational level, and consideration of disadvantaged background.

Eligibility for most assistance is based upon demonstrated financial need. (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 are subtracted from the budget, and 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 suf-
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, 113 North Hall. 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 a gift 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). Submit all parts of the SAR to the UC Davis Financial Aid Office. 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 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, unless the student receives permission to enroll for fewer units.

- Cal Grant A pays the full amount of registration fees.
- Cal Grant B pays a monthly stipend for living expenses for first-year students and a portion of the registration fees plus a monthly stipend for living expenses for students in their second through fourth years.

**University Grants** are available to both graduate and undergraduate students. The maximum varies each year depending on funds available.

**Educational Opportunity Program (EOP) Grants** are restricted to undergraduates.

**Supplemental Educational Opportunity Grants** are awarded on the same basis as University Grants. They are available to U.S. citizens or permanent U.S. residents who are at least half-time students and who demonstrate exceptional financial need while pursuing their first undergraduate degree.

**Bureau of Indian Affairs (BIA) Grants** are awarded to students who are at least one-fourth American Indian, Eskimo, or Aleut 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 counselor on campus can help you complete the application.

- Amount of BIA grant depends on need and availability of funds at each BIA agency.

**Loans**

A Financial Aid Offer almost always includes a long-term, low-interest loan. Repayment of these loans (with the exception of the PLUS/SLS program) begins after you graduate or withdraw from school.

**University Student Loans** up to $18,000 per student are available for graduate studies; payment may be deferred until completion or termination of studies. Cosigner is required for annual amounts above $1,000.

- $4,500 undergraduate maximum for first 2 years
- $9,000 undergraduate maximum during 4 years
- $18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)
- Repayment begins six months after graduation or withdrawal
Federal Perkins Loans are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of a student’s need because of demand and limited funds. Repayment starts six to nine months after graduation or withdrawal from school and may be extended over ten 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.

- $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.

- $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

The 1992 reauthorization of financial aid programs changed the eligibility requirement for HPDSL for medical students. Beginning with the 1993-94 academic year, new HPDSL borrowers must commit themselves to complete a primary care residency program, and practice in a primary care field until their HPDSLs are repaid.

Health Education Assistance Loan (HEAL) Program provides federally insured loans to students attending the School of Medicine. The loans are made by participating lenders, including banks, credit unions, and savings and loan associations.

- $20,000 maximum per academic year (or the financial need of the student, whichever is less)
- $80,000 total maximum
- The HEAL Program does not provide a subsidy for interest
- Interest is set at 3 percent points above 91-day T-Bill rates
- Repayment begins nine months after completion of formal training, including accredited internship and residency programs or withdrawal

Federal Subsidized and Unsubsidized Stafford Student Loans (SSL) are available through banks and other lending institutions. Subsidized loans are based on financial need and interest accrued while the student is in school is paid by the federal government. Unsubsidized SSLs are available to students regardless of income and assets, and there is no interest subsidy.

- Undergraduate students may borrow up to annual maximums of $2,625 for freshmen, $3,500 for sophomores, and $5,000 for juniors and seniors, up to a maximum aggregate indebtedness of $22,000.
- 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.
- Variable interest rate is adjusted annually, capped at 9 percent (new borrowers), 7-10 percent interest (previous borrowers).
- Repayment begins six months after graduation or withdrawal.

Parent Loans for Students (PLUS) and Supplemen
tal Loans for Students (SLS) are government-insured loans that are made to parents of dependent students, to independent undergraduate students, and to graduate or professional students by participating banks and other lenders, regardless of income and assets.

- Parents may borrow PLUS up to the cost of education minus other financial aid received during the years the dependent students are undergraduates.
- Independent undergraduate students or graduate and professional students may borrow SLS up to annual maximums of $4,000 for freshmen and sophomores, $5,000 for juniors and seniors, and $10,000 for graduate and professional students.
- The maximum SLS aggregates are $23,000 for undergraduates and $73,000 combined undergraduate and graduate borrowing.
- 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; or the full amount of in-state registration fees for one quarter may be borrowed in the form of a fee voucher. 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, pick up an application in the lobby of North Hall. Application procedures vary slightly during the registration cycle of each quarter. Check the Short-term Loan bulletin board in the lobby of North Hall for instructions.

Work-Study

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. The Student Employment Center coordinates all college work-study programs.

**Federal College Work-Study Program** is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. 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. This program is primarily used for international students with financial need who would be ineligible for Federal College Work-Study.

The **Student Employment Center** helps students, including those on the Planned Educational Leave Program, and their spouses find both part-time and temporary full-time employment off and on campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require skills ranging from general to highly technical. For further information, see "Student Employment" in the Student Life chapter of this catalog.

## UNDERGRADUATE SCHOLARSHIPS AND AWARDS

Information:
Scholarship Office
207 North Hall
914-752-2332

UC Davis recognizes exceptional students with scholarships awarded on the basis of academic excellence and exceptional promise. The Scholarship Office administers approximately 150 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. Continuing students and applicants for winter or spring quarter should obtain scholarship applications from the Scholarship Office in October. These applications are due in mid-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 $500 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, 914-752-0543.

- 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.

- Generally $100 to $2,000

**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
LIVING AT DAVIS

Residence Halls
Information:
Student Housing Office
916-752-2033

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 3,500 undergraduates and 178 graduate students do just that. Students and professional staff in each of the residence hall complexes help create and maintain an environment conducive to personal growth and educational achievement. About 90 percent of the freshman students live in residence halls. Twenty-five percent of the transfer students elect to live in a residence hall environment. All new undergraduates whose Statements of Intent to Register (SIR) are received before July 1, 1993 are guaranteed residence hall housing as long as they complete all of the instructions that accompany their contracts. All graduate students whose applications are received on or before May 1, 1993, will participate in a lottery for the 178 spaces available in Lytle Leach Hall.

The total room-and-board rate for 1993-94 is $4,985-5,475 for a double-occupancy room and $5,515-6,005 for a single room (of which there are very few available to new residents). Cost depends on which of the six meal plans you choose. Rooms are furnished with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board for each resident.

If the Davis campus is your choice when filling out your University Admissions Application, the Student Housing Office mails necessary housing information with your admissions letter. If you have a physical disability which requires special housing accommodation, please send a detailed letter of explanation to the Contracts and Accounts 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 April and July. At that time you will be able to choose your meal and payment plan.

Student Family Housing: Orchard Park/Solano Park

Information:
916-752-4000

There are 476 University-operated, furnished and unfurnished on-campus apartments for UC Davis student families. The monthly rates for the academic year 1992-93 were as follows:
- Orchard Park, two-bedroom unfurnished apartment, $446
- Orchard Park, two-bedroom furnished apartment, $474
- Solano Park, one-bedroom unfurnished apartment, $350
- Solano Park, two-bedroom unfurnished apartment, $397

Vacancies in Orchard Park/Solano Park are filled from a chronological list based on the date of application. For a fall assignment, you should expect a wait of two to three months after you apply. For an assignment during the remainder of the year, the waiting period is usually shorter. An application may be submitted before you are admitted to the University and before you are married, but you must show documentation of your student and marital or parental status before occupancy can be granted. If a member of your family has a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Russell Park

Information:
916-753-7322

Privately owned and managed on-campus living accommodations are available for student families. Russell Park features one-, two-, and three-bedroom unfurnished units. Monthly rents for academic year 1992-93 ranged from $430 for a one-bedroom unit to $694 for a three-bedroom unit.

Other Graduate Student Housing

Information:
The Atriums
916-752-0859

The Atriums offers on-campus living accommodations for single graduate students. The privately owned and managed apartments feature studio and two-bedroom unfurnished units. For the academic year 1992-93, monthly rent for a studio was $427 and $594 for a two-bedroom unit.

Community Housing

Information:
Student Housing Office
916-752-2483

If you choose to live off campus, the Community Housing Office can be a valuable resource. This office maintains vacancy listings to assist you in roommate selection and in locating rental housing off campus. Housing available in the community includes apartments, duplexes, condominiums, mobile homes, and rooms in private homes. Listings change daily, so they are not furnished by mail or given over the telephone.

Other services of the Community Housing Office include: counseling and mediation of landlord/tenant and roommate grievances; educational programs; publications, liaison with fraternities, sororities, city government offices, and housing-related agencies in the community; and child care information and referral. This office also provides information on accessible housing to persons with disabilities.

STUDENT SERVICES

Student Health

Information:
Cowell Student Health Center
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

Your health is important to you and to the University. Consequently, new students are asked to submit a medical history form, and evidence of rubella and rubella immunity to the Health Center as part of registration.

Since it is not intended that the Health Center supplant the medical care of your family physician, you are advised to have a physical examination by your own doctor before coming to UC Davis. Any problems
capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent loss of study time. Students with contagious diseases will be excluded from the classroom.

The services of the Health Center are made possible, in part, by your registration fees. As an enrolled student paying full registration fees, 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. Some of the Health Center services and facilities are:

- General outpatient care
- Regularly scheduled clinics
- X-ray, laboratory, and pharmacy services
- Physical therapy
- Women's Clinic

The Health Center currently does not provide services for dental problems or routine eye care.

Health Center services are available to students and their dependents on a fee-for-service basis. Also, you may purchase a Health Insurance Plan at the Health Center for your spouse and children.

Health Insurance. Graduate, professional, and international students must purchase a mandatory insurance plan as part of registration. Undergraduate students have an opportunity to purchase a voluntary plan during registration. For more information, you may call 916-752-2612 or visit the Insurance Office at Cowell Student Health Center, 8:00 a.m. to noon and 1:00 to 5:00 p.m., Monday, Tuesday, Thursday, and Friday, and 9:00 a.m. to noon and 1:00 to 5:00 p.m. on Wednesday.

Child Care Programs

Need help with child care? The following programs are available on campus and in the community to help you with child care arrangements and expenses.

- The Community Housing Office distributes child care publications, coordinates an information and referral network among campus units, and serves as the University's liaison with LaRue Park Children's House, Russell Park Child Development Center, and City of Davis Parks and Community Services/Child Care. For further information, contact Community Housing, 101 Student Housing Office, or telephone 916-752-2483.
- City of Davis Parks and Community Services/Child Care provides free resource and referral information and administers a variety of child care subsidies. The program is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. The program maintains information on licensed family day care homes, family child care centers, nursery schools, co-ops, playgroups, and other family-related services. Additional services include workshops and handouts; a bimonthly newsletter; a parenting resource library; and a book, video, and toy lending library. It is located at 23 Russell Boulevard, 916-752-5626.
- The UC Davis Registration Fee Child Care Subsidy Program provides partial child care subsidies to full-time students. Spouses must also be full-time students or employed full time. Eligibility is based on family income, with awards determined by lottery. Parents may choose from licensed family day care homes and child care centers. For additional information, call City of Davis Parks and Community Services/Child Care at 916-757-5626 or drop by 23 Russell Boulevard.
- The Child Care Subsidy Program, funded through the State Department of Education and administered by City of Davis Parks and Community Services/Child Care, provides four separate subsidy programs. Eligibility requirements for the programs vary slightly, but only one waiting list application is required. Parents may be required to pay a fee based on a sliding scale, and in some instances, an additional co-payment may be required. Waiting list applications are accepted year round. Admittance is based on income and priority guidelines set by the state and federal government. For information call 916-757-5626, or drop by 23 Russell Boulevard.
- The Financial Aid Office can assist students who are parents and who qualify for financial aid with allowances for direct child care costs (in-home
provider or child care center charges). This office is in 113 North Hall, 916-752-2390.

- The Student Employment Center posts job listings of parents wishing to hire child care providers. This office is in 114 South Hall, 916-752-0520.

- LaRue Park Children’s House and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Residents of Russell Park, Orchard Park, and Solano Park student family housing pay reduced rates. Information about LaRue Park Children’s House, which serves infants through preschool-age children, can be obtained at 916-753-8716. Information about Russell Park Child Development Center, serving infants through school-age children, is available by calling 916-753-2487.

- The Early Childhood Laboratory is a teaching and research facility for the Human Development Program and Family Studies Unit. Four different programs accommodate children from the ages of six months to six years for three hours a day, following the UC Davis academic calendar. Students pay lower tuition than do UC Davis staff, faculty, and community-affiliated families. Children are selected from a waiting list according to criteria designed to meet academic goals. The laboratory is located on campus, and the office is in TA 117, 916-752-2268.

- The Perfect Tender Infant Care Cooperative serves six infants under twelve months of age whose parent(s) attend the School of Law. Contact 916-752-0243 for additional information.

- The Women’s Resources Center sponsors the Child Emergency Notification Service, intended to provide schools and child care providers with a means of contacting student parents in the event of a health-related emergency involving the child. Interested students must sign up for this service in person; this includes providing information that will assist a staff member in notifying the parent if she or he is in class at the time of the emergency. This service, available to single parents and others with special circumstances, is intended as a back-up if the child provider cannot reach the primary emergency contact. The center is located in 10 Lower Freeborn, 916-752-3372.

**Student Employment**

Information:
Student Employment Center
114 South Hall
916-752-0520

The Student Employment Center helps students who are enrolled in a full-time or part-time degree program, students on PELP, students’ spouses, and students with a letter of acceptance for the following quarter who have not yet registered.

Employment opportunities exist on campus, in the city of Davis, and in adjacent communities. Full-time, part-time, and temporary jobs are available during the school year and vacation periods. 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. Students are encouraged to begin looking in January for summer jobs.

Offers of employment are conditional, subject to proof of identity and U.S. citizenship or your right to work in the U.S., as required by federal law (Immigration Reform and Control Act 1986).

The center is open from 9:00 to 11:45 a.m. and from 1:00 to 4:00 p.m.

**Transportation and Parking**

Parking. If you park a vehicle (including a motorcycle or moped) on the Davis campus you must have a valid parking permit or pay at a meter Monday through Friday between the hours of 7:00 a.m. and 10:00 p.m. Parking lots on campus are financed solely by fees collected from parking permits and meters. Daily permits are currently $2.00 and may be obtained from permit dispensers located in lots 1, 5, 25, 47, 47A, 49, 50, 54, and 81; daily permits for lots 15 and 30 are $1.00. Long-term permits are required for all other parking lots, and may be purchased at the Transportation and Parking Services Office, located on Extension Center Drive directly south of lot 30 and the Rec Pool. For visitor parking information, please consult the South Gate Kiosk on Old Davis Road, or call Transportation and Parking Services at 916-752-8277.

Campus Shuttle. The TAPS (Transportation and Parking Services) Intracampus Shuttle System provides service to the central campus area. Other TAPS shuttles provide service to the UCD Medical Center, Research Park, and University facilities on Chiles Road.

Buses. Unitrans, 13 bus lines operated by the Associated Students, serves the campus and city year round. Undergraduate students ride by showing a valid registration card. Others ride by paying a cash fare or purchasing tickets or passes 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, and all academic break periods. Schedules are available at the MU Information desk, bus terminals, City Hall, Chamber of Commerce, Post Office, and at the Unitrans office.

Ridesharing. UC Davis encourages ridesharing. For information on transportation alternatives to the Davis campus, call 916-752-MILE or visit the Transportation and Parking Services Office located on Extension Center Drive. Alternatives include carpooling and vanpooling (registered pools receive reduced parking rates as well as preferential parking), public transit, commuter match assistance, and shuttle systems.

**RECREATION AND THE ARTS**

No matter what your recreational bent—horseback riding, outdoor activities, music listening, art and crafts, bowling, swimming, or sports—the Davis campus has a place where you can enjoy it.

Facilities and programs such as the Equestrian Center, Craft Center, Outdoor Adventures, Recreation Hall, Intramural Sports, MU Art Gallery, Recreation Swimming Pool, or the MU Games Area will help you balance the academic demands at UCD with your leisure interests.
Memorial Union and Campus Recreation

Information:
Memorial Union Programs and Campus Recreation
463 Memorial Union
916-752-1730

The Memorial Union (MU) complex, directly north of the Quad, serves as the community center for the campus. Bring yourself up to date on local events by stopping at the MU Campus Information Center on the first floor. A valuable resource for current students as well as new students and visitors, the center can also be reached by telephone, 916-752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop, and Coffee House.

King Lounge on the second floor features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. The MU Art Gallery and a complex of meeting rooms, the MU II Conference Center, complete the second floor. In addition to the administrative offices of the Memorial Union and Campus Recreation, the offices of ASUCD, and Student Activities and Judicial Affairs can be found on the third and fourth floors of the MU tower. Freeborn Hall is a 1,250-seat assembly hall used for dances, performing arts, banquets, lectures, and conferences. The Campus Box Office, where you can purchase tickets for campus events and cash checks, is in Freeborn.

The MU Art Gallery and Music and Periodicals Center, adjacent to King Lounge on the second level of the Memorial Union, feature a changing series of contemporary and historical art exhibits throughout the school year. The gallery sponsors print sales, special programs, and lectures, as well as internships for those interested in career work in an art gallery or museum. The Music and Periodicals Center provides current periodicals for leisure reading and has a large library of music for your listening pleasure. Further information regarding these services may be obtained by calling 916-752-2885/1730.

The Games Area, located below the UCD Bookstore, is a recreational facility consisting of a bowling center, billiards room, video arcade, lounge, and storage lockers. The Games Area conducts bowling leagues, classes, clinics, and tournaments for all ages from beginners through advanced skill levels. The facility is fully accessible to the disabled. Call 916-752-2580/1730 for details.

The Memorial Union has 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 eaves-covered patio surrounding the lodge offers a lovely, shaded environment for outside dining during the warm weather months. Situated in the secluded Arboretum on the southeast perimeter of campus, Putah Creek Lodge provides a relaxing atmosphere for lectures, banquets, weddings, or dances. The spacious lawn surrounding the lodge is available for a variety of activities like volleyball, receptions, and picnics. Additional lodge amenities include kitchens and outdoor barbecues.

Outdoor Adventures, located in the Barn on the corner of California and Hutchison, will help you plan your outdoor excursions and develop your outdoor skills. You can rent equipment of professional quality for your adventure. An up-to-date library contains topographic maps, trail guides, and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, white-water rafting, kayaking, sea kayaking, mountaineering, cross-country skiing, and other sports are offered throughout the year. Group rates and custom-designed trips can be arranged. Many special activities such as wilderness emergency-care clinics, white-water river guide training, slide presentations, and programs conducted by outdoor experts are also held. Stop in and share your own outdoor experiences! For more information call 916-752-1995/1730.

The Equestrian Center, southwest of the Veterinary Medical Teaching Hospital off Garrod Drive, is active all year round, providing trail rides, practice sessions, and instruction in both English and Western riding. Group and private lessons are available for beginning through advanced levels, and trained volunteers can provide an educational experience for those interested in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, summer equestrian camps, and special events, and also coordinates the Polo and Equestrian Clubs for student participation. Telephone 916-752-2372/1730 for further details.

The Recreation Swimming Pool, at the corner of La Rue Road and Hutchison Drive, is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts, and an extensive grass area for sunbathing. The staff offers 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 Hickey Gymnasium Pool is also available on a limited basis for noontime recreational lap swimming. More information regarding these services can be obtained by calling 916-752-2695 or 916-752-1995/1730.

The Silo Union, recently renovated to serve a variety of campus needs, offers food services, meeting/conference facilities, lounges, and the campus pub. If you would like to reserve space in the Silo for a meeting, social event or conference, contact Campus Events and Information at 916-752-2813.

The Craft Center in the South Silo 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 such varied crafts as woodworking, weaving, jewelry-making, art and graphics, ceramics, photography, silkscreen printing, welding, leatherworking, and stained glass. Call for more information: 916-752-1475/1730.

The South Silo also houses the ASUCD Experimental College (916-752-2568), Student Special Services (916-752-2007), Graduate Student Association (916-752-6108), and a small branch of the Bookstore serving the School of Law (916-752-2961).

Recreation Hall

Information:
Entrance 18
916-752-6073

Recreation Hall is a multi-use arena available 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 Recreation Hall. The tri-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball, and squash courts; a weight room with free weights, universal, hydraulic machines, stair-masters, rowing machines and bicycles; court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance. The upper level north area has a state-of-the-art artificial rock climbing wall for climbers of all skill levels. The Special Events Room can be reserved for meetings by calling the Campus Events and Information Office.

Students can use Rec Hall facilities by showing their current, valid photo ID card. They may also purchase a $6.00 guest pass valid for three people. Nonstudents may purchase a privilege card at Rec Hall to use lockers, equipment, and facilities. Patrons may also purchase a daily pass at the 1B entrance. Rec Hall is open Monday through Friday from 6:30 a.m. – midnight, Saturdays 9:00 a.m. – 6:00 p.m., and Sundays noon – 10:00 p.m. throughout the year. Rec Hall hours are shortened during quarter breaks and summer.

Recreation Hall maintains an outdoor fitness cluster on Orchard Field, the tennis courts on La Rue Road, just north of the Rec Pool, and the volleyball and basketball courts west of the Guedo residence hall complex. While these courts are primarily for student use, they are also available to the general community. The courts cannot be reserved and are available on a first-come, first-served basis.

Intercollegiate Athletics, Intramurals and Club Sports

Information:
264 Hickey Gymnasium
916-752-1111 (Intercollegiate Athletics)
916-752-3530 (Intramurals and Club Sports)

Intercollegiate athletics, intramurals, and club sports programs provide organized sports competition and physical recreational activities across the broad spectrum of student physical abilities. The underlying objective is to offer a coordinated program of sports participation that meets student needs at every level of competence and depth of interest.

Although intercollegiate athletics at Davis is intended to benefit the campus by providing esprit de corps, its prime 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 eleven men’s sports and nine women’s sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 1,000 students compete on varsity or junior varsity teams each year.

The club sports program includes both recreational and competitive offerings involving 37 sports with 1,400 participants per year, while the intramurals program provides competition in 36 sports and serves approximately 18,000 participants.

The Arts

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

UC Davis Presents (916-757-3199), located at 200 B Street, Suite A, brings a wide variety of touring performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, UC Davis Presents offers concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern, and ethnic dance; and lectures by eminent public figures. Various departments such as English, the foreign languages, and history sponsor lectures, poetry readings, and exhibits open to the University community. Bulletin boards, kiosks, the student radio station KDVS, and the California Aggie inform audiences about upcoming events.

You’ll find annual and quarterly brochures and promotional materials on all events sponsored by UC Davis Presents at the UC Davis Presents office. Tickets for UC Davis Presents events may be purchased at the Campus Box Office in Freeborn Hall, or any BASS/TM outlet.

Music

The Department of Music (916-752-0666) sponsors the UCD Symphony Orchestra, Chorus, Chamber Singers, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the University community. The department sponsors the annual Theatre of Voices Festival and also an artist-in-residence for one quarter each year who gives 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 UC Davis Contemporary Music Players and the UCD Faculty Woodwind Quintet are in residence on campus. The Department of Music sponsors nearly one hundred public concerts each year.
The Department of Dramatic Art has one of the best theater facilities in California. The excellent faculty and the Granada Artists-in-Residence program (which brings a major British director to the department each quarter); graduate students working on Master of Fine Arts (MFA) degrees in acting; and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year’s drama schedule includes University Theatre Season (five major productions of established plays); Second Season (five smaller productions of established plays written by students); and dozens of class-related projects. 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

A tour of all the UCD art galleries will take you from one corner of the campus to the other. The Memorial Union Art Gallery (916-752-2885) features a series of changing contemporary and historical art exhibits during the school year. Works by professional artists as well as students are on display for periods of six weeks.

The Design Gallery (916-752-6223) on the first floor of Walker Hall is known for its exciting exhibitions of design-related material. Changing presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Student Show and Picnic Day Exhibition reflect the interests of the design program. The Design Gallery is an innovative space where the installations are as interesting as the material presented.

The Richard L. Nelson Gallery (916-752-8500), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery 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 provides aesthetic enrichment to the University community and the Northern California area at large. The Fine Arts Collection (916-752-8500) is located adjacent to the Nelson Gallery. Representing various historical periods and cultures, it is the Davis campus’s major collection of art. Selected works are available for viewing weekday afternoons. The Basement Gallery is a student-directed gallery that exhibits artwork of advanced UCD art majors. The gallery is located in the Art Building. The exhibitions change weekly throughout the academic year. Hours are 9:00 a.m. to 4:00 p.m. Monday-Friday.

The C. N. Gorman Museum (916-752-6567, Native American Studies), is located on the first floor in Hart Hall. The museum was established in 1973 in honor of Carl N. Gorman, 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. Hours are noon to 5:00 p.m., Tuesday-Friday and by appointment.

ASSOCIATED STUDENTS (ASUCD)

Information:
Executive Council Office
370 Memorial Union
916-752-3632
ASUCD Main Office
364 Memorial Union
916-752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by the Regents and the Chancellor, represents all undergraduate students. Law and graduate students also currently have access to all ASUCD commercial activities. Funds allocated to ASUCD provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

The student government budgets the allocated funds each year through its Executive Council. Based on the city council form of government, the Executive Council consists of seven elected council members and the Council President and Vice President. The Council is the policy-making body for ASUCD and supervises all aspects of the association. The Council President is the chief administrative officer for ASUCD 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 University administration, the Regents, and the Davis city government.

Five commissions are subordinate advisory bodies of the Executive Council, and assist the governing board with its decisions by research and legislation and making recommendations. Commission chairpersons are ex officio members to the Council. Each commission also involves itself with various projects that relate to their specific area.

- External Affairs deals with off-campus concerns (City of Davis, the Regents, social responsibility, etc.).
- Internal Affairs recommends policies to improve the quality of nonacademic student life on campus.
- Academic Affairs acts as an advocate to 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 Executive Council on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UCD’s 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.

The judicial branch consists of two boards whose members are appointed by the Executive Council Chair.

- The Student Judicial Board is responsible for determining eligibility of candidates for elective office in ASUCD and interpreting and enforcing the ASUCD Constitution.
- The Student Appeals Board rules on appeals to Student Judicial Board decisions.

ASUCD operates more than forty activities and services
for UCD students. Information about these services can be found in the Student Directory, which combines details about ASUCD services and organizations and the ASUCD student telephone directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the services operated by the ASUCD for University students include the Unitrans bus system, California Aggie newspaper, the Bike Barn repair services, travel service, free legal advice for undergraduate students, and the Coffee House in the Memorial Union. The Student Viewpoint, an evaluation of professors and classes, includes the names of instructors who have received the student-awarded Magna Runnning Award for Teaching Excellence. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities include Radio KDVS stereo FM, Classical Notes and Campus Copies, Housing Viewpoint, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, and Picnic Day. ASUCD also cooperates with Associated Student groups on other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to state government, as well as a full-time student lobby on the national level to represent student interests on such matters as financial aid.

Chancellor’s Administrative Advisory Committees

Students may become involved in issues affecting the campus community by applying for membership on an Administrative Advisory Committee. Each committee advises on policies affecting campus life in a specific area, such as athletics, child care, financial aid, student health and counseling, transportation, and registration procedures.

The committees respond to requests for advice, identify needs or concerns within the charge of the committee, and recommend action to the administration. As members of an Administrative Advisory Committee, students can make sure that student perspectives are well represented in the Committee’s recommendations, and, in turn, learn more about faculty, Academic Federation, and staff views of campus issues. Applications are accepted each fall for service on committees the following academic year.

GRADUATE STUDENT ASSOCIATION (GSA)

Information:
Room 253, South Silo
916-752-6108; e-mail: gsa@ucdavis.edu

GSA is the officially recognized student government for UC Davis graduate students. Funded by graduate student fees, GSA provides services to graduate and professional students and protects and promotes their interests at all levels of the University administration. All regularly enrolled graduate students and students in the Graduate School of Management pay the quarterly GSA fee and are automatically members. Other professional students are eligible to join GSA by paying the fee, but currently do not do so automatically.

GSA is run by graduate and professional students who devote time and expertise to the General Assembly, the Executive Council and committees. 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. To find out what GSA can do for you, please call or visit the GSA office.
STUDENT ACTIVITIES

Information:
Student Activities Office
4th Floor, Memorial Union
752-2027

There are over 300 registered student organizations at UCD, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. The Student Activities Office registers these diverse groups and provides advising on activities, resources, and campus policies. In addition to the subunits described below, Student Activities administers a number of campus programs: Danzantes del Alma folkloric dance troupe, Club Finance Council, Activities Faire, Leadership Training Programs, and national collegiate leadership awards competitions. Student Activities staff assist individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.

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, Semana de la Raza, 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. The UCD Spirit Squad, a group of talented and enthusiastic dancers, stunt team members, and gymnasts, travel and perform with the band.

JUDICIAL AFFAIRS

Information:
Student Judicial Affairs
4th Floor, Memorial Union
916-752-1128

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of University policies or campus regulations. In addition, 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 aids in conflict resolution and can provide interpretations of University policies and regulations.

Student Conduct and Discipline

Students enrolling or seeking enrollment in the University assume an obligation to act 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, in the Student Activities Handbook, in the Guide to Residence Hall Life, and in the booklet, University of California Policies Applying to Campus Activities, Organizations, and Students. The operation of the campus student disciplinary system is outlined in the booklet UCD Administration of Student Discipline. These policies and regulations are available from the Office of Student Judicial Affairs, 463 Memorial Union.

A one-sheet summary of student conduct expectations is distributed during fall quarter registration. 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; harassment, including "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 which may be imposed range from a warning to dismissal and/or restitution.

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, published in the campus newspaper, 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.

ALUMNI ASSOCIATION

Information:
Cal Aggie Alumni Association
Walter A. Buehler Alumni and Visitors Center
UC Davis
Davis, CA 95616-8517
916-752-0286
Toll free in California 1-800-242-GRAD

After graduation, you can maintain your ties with UC Davis and your fellow alumni by joining and participating in the Cal Aggie Alumni Association.

This worthwhile and vibrant organization sponsors a wide variety of activities and programs that support UC Davis and keep alumni in touch with the campus. Members are also entitled to special privileges. As a new graduate, your first year of membership is only $20, a $15 savings off the regular annual membership fee. For more information, call the alumni association or drop by the Alumni Center before you graduate.
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 is especially desirable for students during their first year and for seniors during the final quarters preceding graduation.

College of Agricultural and Environmental Sciences

Office of the Dean
228 Mrak Hall
916-752-0108

The Dean's Office provides you with

- Staff advisers who can advise you on 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.
- Additional services: study plan clearance, College English requirement check, release of holds on registration packets, final evaluation for graduation, evaluation of Transfer Core Curriculum.

Academic Advising Center

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 located 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.

Advising Center. Advising on academic programs is available at the College's Academic Advising Center, 202 Mrak Hall.

Primarily, the Academic Advising Center advises students in the Exploratory Program. Advising for Individual Majors is also available at the Academic Advising Center.

College of Agricultural & Environmental Sciences Undergraduate Programs

Major programs in the College of Agricultural and Environmental Science 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 following areas of study include majors with specific focuses:

Environmental and Resource Sciences and Policy majors focus on the broad facets of the human and natural environments and their interactions. These majors 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.

- Applied Behavioral Sciences
- Atmospheric Science
- Environmental and Resource Sciences
- Environmental Policy Analysis and Planning
- Environmental Biology and Management
- Landscape Architecture
- Range and Wildlands Science
- Soil and Water Science
- (Wildlife and Fisheries Biology)

Plant Science majors provide students with a strong background in plant biology in the context of 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. A wide range of options within the major allows students to focus on such areas as agricultural communications and education and sustainable agriculture. The plant biology and plant science majors provide a basic background in all areas of plant biology, including plant development and protection, biotechnology, and post-harvest physiology.

- Agricultural Systems and Environment
- Plant Biology (with the Division of Biological Sciences)
- Plant Science

Animal Biology major programs 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.

- Animal Science
- Animal Science and Management
- Avian Sciences
- Entomology
- Wildlife and Fisheries Biology (see Environmental and Resource Sciences and Policy area)

Human Health and Development programs offer a wide assortment of curricula focusing on basic human needs (i.e., food, diet, clothing, and shelter) and human development. Together, these programs link the processing of food and fiber with consumer health and well-being. Emphasis is on the continuum between food/fiber production and consumer use—a continuum that includes a strong attention to product quality as well as to human needs and preferences. These majors also address the physiological, psychological, social and aesthetic dimensions of human health, comfort, safety, and the quality of life.

- Community Nutrition
- Design
- Dietetics
- Environmental Toxicology
College of Engineering

Departments and Advising Centers

Undergraduate Office (1050 Engineering Unit II). By contacting the Undergraduate Office, you may obtain information and assistance on academic, career, and personal matters either through direct assistance with one of the staff members or through referral to other offices on campus. The Undergraduate Office handles student petitions, evaluation of transfer units, articulation, and degree certifications.

Faculty Advisers. You will be assigned a faculty adviser before your first term on campus. Students in engineering usually retain the same faculty adviser throughout the undergraduate program, but you may change to a new adviser of your choice whenever you wish. It is necessary only to keep the Undergraduate Office informed of adviser selections.

Faculty advising is supplemented in some departments by a system of staff advising especially designed for students in that department. Consult your departmental office for more information.

You are expected to meet individually with your faculty adviser at least once each quarter. Freshmen are strongly urged to do so each quarter of the first year of enrollment, and new advanced-standing transfers should meet with a faculty adviser for the first quarter.

To facilitate dialogue with your adviser on your program of study, use the Advising Worksheets. Extra copies are available in the Undergraduate Office. You should work out your Lower Division Worksheet early in your freshman year, have your adviser sign it, and then review it regularly with your adviser. Similarly, the Upper Division Worksheet should be worked out early in the junior year, signed by your adviser, and then reviewed regularly with your adviser.

Peer Advisers. Faculty advising is complemented by a well-developed peer advising system. Student advisers are available at Bainer Hall, Engineering Unit II, and at other locations described in the Other Academic Advising section of this chapter.

College of Letters and Science

Office of the Dean/Letters and Science Advising Office

150 Mrak Hall
916-752-0032

The Associate Deans and staff in the Letters and Science Advising Office can assist you with a wide variety of 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
• 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 UCD

Departments and Advising Centers

Faculty Advisers. New students are assigned to a faculty adviser when the University receives their Statement of Intent to Register. 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 are no longer obligated to consult an adviser except at checkpoint stages (below). They are urged, however, to maintain regular contact with an adviser in their major to avoid program errors that may delay graduation. Seniors should maintain close contact with their adviser in order 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 in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Students living off campus are asked to contact the Letters and Science Advising Office early in the quarter to receive their adviser assignments.

Advising Checkpoints. You are required to consult with your faculty adviser at two, possibly three, critical stages in your academic career:

• Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and graduation requirements. You must also have declared a major by this time. Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.

• When you complete 135 units of degree credit, including transfer work, you should obtain 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 Letters and Science Advising Office immediately. Exceptions to the 225-unit limit are granted by the dean only rarely. Typically, approval is granted only to allow completion of minimum degree requirements.

If you have not met with your faculty adviser before these established checkpoints, a hold will be placed on your registration materials as a reminder.

Peer Advisers. Student-to-student advising is an important part of the University advising services. The College of Letters and Science student assistants to the dean are available during regular office hours in 150 Mrak Hall to talk with students about their academic concerns.

Division of Biological Sciences

The Division of Biological Sciences Office
66 Briggs Hall
916-752-0410

The associate dean and staff in the Division of Biological Sciences Office can assist you with a variety of issues including PELP, withdrawal, part-time status, change of major, and some financial aid forms.

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 division office.

Sections and Advising Centers

Students entering or intending to declare sectional majors in biochemistry, botany, genetics, microbiology, physiology, or zoology should contact the specific section office for academic advising services. Students selecting the biological sciences major should contact the Division of Biological Sciences Office for academic advising services.

OTHER ACADEMIC ADVISING

Academic Peer Advising

Academic Peer Advising 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 concerning graduate schools, career opportunities, and college requirements. For more information contact the main APA office in 107 South Hall, 916-752-3000.

The First Resort

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 tutor listing and referral service, a listing of courses of 1 to 3 units, and other valuable resources. Pre-graduate school information is available, and graduate school bulletins and other supplemental materials on hand are useful in selecting a graduate program. If you have a problem, remember—start with The First Resort, which is open from 9 a.m.-4 p.m. throughout the academic year. (Temporary Building 98, across from the Chemistry building, 916-752-2807 for information or 916-752-3323, the advising hotline.)

Orientation and Summer Advising Office
The Orientation and Summer Advising Office coordinates the Summer Advising and Registration Program, Fall Quarter Orientation activities, and many 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 students' changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome. The coordinator's office is located in 107 South Hall, 916-752-3000.

Advising Services
The Pre-Business School Adviser, 107 South Hall (916-752-3000), is a student peer adviser who can assist you in seeking information about graduate schools in business, management, and public administration. This office also works with students who are in the process of applying to graduate school in business and distributes the Graduate Management Admission Test (GMAT) booklet.

The Pre-Graduate School Information and Referral Service is a program available through Advising Services to assist students interested in M.A., Ph.D., or teaching credential programs. Specific 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. Advisers are available through the main Advising Services office, 107 South Hall, 916-752-3000.

The Pre-Law Advising Office is where students interested in legal profession can come for information. The staff can advise you about admission requirements and program planning. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials, and general career information. Students can get more information for preparation for law school and a legal career through the many seminars and workshops held each year. You may contact one of the pre-law advisers in 107 South Hall, 916-752-3009.

The Health Sciences Advising Office, 106 South Hall (916-752-2672), will be an important place for you if you are preparing for a profession in the health science area. The professional staff and student advisers can provide information on requirements, application procedures, professional school curricula, and related options. The office maintains an extensive library of school catalogs, statistics, and books and journals related to health education.

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)
Information:
313 North Hall
916-752-5472

The Educational Opportunity Program/Student Affirmative Action Information Office serves EOP/SAA students by assisting them with their academic, social, and personal adjustments to the University environment; coordinates EOP/SAA 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. In addition, those students interested in pursuing the "helping" professions can receive training and experience through the Peer Adviser Counselor training program.

EOP/SAA Information Office services are also accessible at various outreach locations throughout the 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. All students are invited to telephone or stop by the EOP/SAA Information Office on the third floor of North Hall or any one of the outreach locations to find out more about the peer counseling services.

ACADEMIC HELP
Learning Skills Center (LSC)
Information:
The Basement, South Hall
916-752-2013

At the Learning Skills Center you can receive assistance in a wide variety of areas, including:
- 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
- Test anxiety reduction and more

In addition to the above areas of assistance, the Center provides individual tutoring sessions for students on academic probation or subject to dismissal. Group and drop-in tutoring are available to all students.

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

The Learning Skills Center is open Monday through Friday, 8 a.m.-5 p.m. Come in and ask about our services, which are free to all UC Davis students.
EOP/SAA Tutoring
Information:
Learning Skills Center
The Basement, South Hall
916-752-2013

EOP/SAA tutoring is a free service for EOP and affirmative action students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in most course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, pre-arranged 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.

Special Transitional Enrichment Program (STEP)
Information:
Learning Skills Center
The Basement, South Hall
916-752-2013

New EOP/SAA students (fresmen) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admitted EOP/SAA 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.

Learning Resource Centers
Information:
Student Housing
Lora Jo Bossio
916-752-1736

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, a reference library, language tapes, study skills sheets, an exam file, and a quiet place to study.

RESOLVING ACADEMIC PROBLEMS
The Grievance Process

Discrimination/Harassment. If you believe that you have been discriminated against or harassed, you may contact the office of Student Judicial Affairs (see below) or the ASUCD Grievance Center (see below) for information and assistance. Advice is also available from the campus’s Sexual Harassment Information Line (916-752-2255) or the office of Student Judicial Affairs (see below).

Grade Changes. If you believe you received an incorrect grade due to a clerical 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 below).

Other Grievances. If you need a requirement waiver or any other type of variance, contact your faculty advisor 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).

ASUCD Grievance Center
Information:
ASUCD Academic Affairs Office
375 Memorial Union
916-752-6101 or 752-8009

The ASUCD Grievance Center advocates students’ academic concerns to the faculty and administration. Grievance counselors deal with students one-on-one, directing them to appropriate channels through which to state their grievances (i.e., student-faculty relations, sexual harassment, grade change problems, prejudicial treatment in the classroom, and problems with academic procedure and policy).

Committee on Student-Faculty Relationships
Information:
Academic Senate Office
356 Mrak Hall
916-752-3920

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. It may not, however, make any binding decisions.

Student Judicial Affairs
Information:
Student Judicial Affairs
4th Floor, Memorial Union
916-752-1128

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

STUDENT SERVICES
Counseling Center
Information:
219 North Hall
916-752-0871

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems that affect their academic progress and sense of well-being. To make an initial appointment, telephone or come to the Counseling Center. Students, faculty or staff who have a concern about a student or desire assistance in making a referral, are encouraged to call the center.
The House
Temporary Building 16
24-Hour Hotline: 916-752-2790
Business Line: 916-752-0665

Located in a green, two-story house next to the Housing Office, 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 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 or telephone basis. The House is open seven days a week and is wheelchair accessible.

Health Education
Information:
Cowell Student Health Center
916-752-9652

Because maintaining good health is vital for the successful pursuit of your educational goals, the Health Education Program provides information and services through five programs. Trained peer counselors, health educators, workshops, and resource libraries are available through:

Campus Alcohol and Drug Abuse Prevention Program (CADAPP) (916-752-6334)—Individual alcohol/drug behavioral assessments with professionals or peers on an appointment and drop-in basis; small six-week alcohol education groups open to students with personal concerns about alcohol/drug use; an academic course and workshops for students, faculty, and staff on peer counseling skills, dysfunctional families and alcoholism/addiction.

Student Educators in Substance Abuse Prevention (916-752-DRUG or 752-3784)—Information on alcohol and other drugs, support and referral for students who have or know someone with a substance abuse problem.

Health Advocates (916-752-9651)—Information and peer counseling on nutrition, exercise, stress management, eating disorders, and other wellness issues. Individual computerized nutritional assessments available by appointment.

Peer Counselors in Sexuality (916-752-1151)—Information and peer counseling (in person or by phone) on birth control, pregnancy, sexually transmitted diseases (including HIV/AIDS), safer sex, healthy relationships, sex roles and other issues related to sexuality.

Bicycle Safety and Injury Prevention Program (916-752-4142 or 752-9652)—Information and presentations on bicycle safety, equipment, laws, and injury prevention.

International Student Services (S.I.S.S.)
Information:
Services for International Students and Scholars
300 South Hall
916-752-0684

The S.I.S.S. Office assists incoming international students and scholars in making preparations for study in the U.S. S.I.S.S. helps students in maintaining their legal status while at UCD, and facilitates the international transfer of funds in order for students to maintain their academic endeavors. In addition, S.I.S.S. provides immigration, personal, cultural, and financial advising.

All new and transfer international students are required to attend a special orientation program that is held just before fall quarter registration. The orientation will help you with registration, class enrollment, immigration regulations, making housing arrangements, and finding campus services and community resources.

Students must report to Services for International Students and Scholars as soon after their arrival as possible. S.I.S.S. can help you with your immediate needs, and familiarize you with the Davis campus and community. S.I.S.S. will introduce you to the Davis international community, and help you locate other individuals from your home country.

Student Special Services
Information:
160 South Hall
916-752-2007

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

Disability Resource Center
Information:
Disability Resource Center (DRC)
160 South Hall
916-752-3184 (voice) or 752-6100 (TeleDial for the Deaf)

The Disability Resource Center (DRC) serves students who find their disability is a barrier to achieving academic or personal goals. Most often this occurs as individuals begin UCD, get established in the community, set up class support, seek personal/social outlets or plan career/personal changes. DRC provides information concerning campus as well as community resources, and provides specialized support not available elsewhere.

DRC was founded with a strong commitment to improving individual choices, personal control of essential resources, and integrated participation in campus life. All University students are assumed to have similar needs, but the consequences of a disability may include some specialized requirements. Therefore, we work closely with each student in identifying his or her particular needs.

Academic and mobility resources for registered students with verified permanent or temporary disability-based needs include the following:

- Alternative educational materials, including large-print and taped textbooks
- Disability management counseling
- Emergency wheelchair repair
- Facilitation of access to all campus programs
- Registration assistance and priority registration
- Maintenance of a list of personal care attendants
- Peer support groups
- Reader and notetaker services
- Referral for special parking
- Referral for tutoring
- Referral to on-campus and off-campus resources, services and agencies
Draft Information
Information:
Student Special Services
160 South Silo
916-752-2007/2020

The Office for Draft Information assists students who have inquiries and problems regarding their Selective Service status.

Students will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Even during periods when induction is not in effect, draft-eligible students may still have legal responsibilities for registration and status changes. This office provides individual advising and consultation on legal obligations and classification options and conducts group workshops in all areas related to the draft.

If you are confused or unsure of your current Selective Service status, the office can help by offering information, assistance, alternatives, and support.

Rape Prevention Education Program
Information:
Fire and Police Building, Kleiber Hall Drive
916-752-3299

The goal of the Rape Prevention Education Program (RPEP) is to explore myths and expose the realities of sexual assault. Focusing on prevention through education, the program reaches out to the UCD community in a variety of ways. Services include the following:

- Free discussions and workshops for student groups and classes on topics such as rape prevention and safety awareness, sexual harassment, acquaintance rape, men and rape prevention, media images of women, and pornography
- Seven-week self-defense classes for women, offered quarterly
- Tear gas certification classes
- Short-term counseling, referrals, and support groups for victims of rape or sexual assault, and for incest survivors
- Training for peer counselors and professionals
- A circulating library of books, videos, and articles on sexual assault and related issues
- Quarterly newsletter, Freeing Our Lives
- Call RPEP for drop-in hours or to make an appointment

RPEP has student work-study positions, and a volunteer staff. Contact RPEP if you have questions.

Reentry Student Services
Information:
Reentry Student Services
160 South Silo
916-752-2005

The Reentry Student Services Office assists students who have reentered the university after several years of life and work experience. The office provides admissions assistance, information, and peer support. It also provides referral assistance through the Reentry Resource Network composed of representatives from existing student services units, colleges, and divisions (e.g., from the Women's Resources and Research Center, Financial Aid, Student Housing, the Dean's Offices, etc.). In addition, the office sponsors special programs for new reentry students and assists members of Advocates For Reentry Students.

Transfer Student Services
Information:
Transfer Student Services
160 South Silo
916-752-2200

The Transfer Student Services Office assists students who have transferred from other institutions of higher education. The office coordinates transfer student matters among existing student services units to ensure students an easy and smooth transfer to the University. It also sponsors special receptions and workshops for new transfers, links them to second-year transfers, publishes an annual Transfer Guide of available campus services and assists members of the Transfer Student Association.
The Veterans Affairs Office assists veterans, dependents of deceased or disabled veterans, and reservists through a variety of federal, state, and campus programs. The office certifies course attendance to the Veterans Administration, coordinates a tutorial assistance program, provides advice and support, and helps with employment, 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 get your claim processed.

Women’s Resources and Research Center (WRRC)
Information:
10 Lower Freeborn
916-752-3372

The Women’s Resources and Research Center brings attention to and challenges the barriers that inhibit the inclusion, equal power, and advancement of women. The center promotes an understanding of the evolving roles of women and men, and helps women develop their full potential. To this end, the WRRC provides a UCD community with a women’s studies library, information and programs on the educational, career, and personal needs and interests of women.

The center encourages you to drop by and talk with our friendly, knowledgeable professionals and student interns. Student internships are available in legislative work, graphics, library, editing, and program planning.

**INTERNSHIPS AND CAREER SERVICES**

**Internship Programs**
Information:
The Internship and Career Center
2nd floor, South Hall
916-752-2855

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, and 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
916-752-2855

If you are an undergraduate, graduate, or alumnus, ICC can assist you in (1) identifying your abilities and interests, and relating them to jobs; (2) gaining access to practical experience to increase your competitiveness in the job market; and (3) finding out how and where to look for the jobs you want. If you are considering dropping out of the University for a term of longer, an adviser can also give you information about internships and employment opportunities.

The Howe Career Resources Library contains material that can aid you in learning how your major field of study can be translated into job opportunities, as well as data concerning types of employment graduates have obtained (summarized by academic major). Useful to job-seekers—and available free of charge—is ICC’s *Placement Manual*, which provides guidelines for preparing a resume, tips on being interviewed, and information on employment in government, business, and education.

To assist students in finding jobs after graduation, 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
916-752-3724

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. Services include the following:

- Teaching job vacancy listings
- Placement files (professional dossiers)
- Special workshops on writing teaching resumes and curriculum vitae, and on preparing for interviews
- Individual advising

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. In addition, 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
227 South Hall
916-752-3813

Human Corps is a student community services program. Public service work can be a rewarding and satisfying experience that may also improve student's qualifications for the job market. Service can be paid or non-paid and can take many forms, from a one-day activity to a long-term commitment.

The goal of Human Corps is to facilitate student involvement in community service by serving as a referral center for students wishing to volunteer and a resource for agencies looking for volunteers.
REGISTRATION
Information:
Registrar's Office
124 Mrak Hall
(916) 752-9273

Registration is the means by which you become a student at the University. The registration process includes registering in classes, paying fees, and completing and filing informational forms. Every UCD student must register each quarter.

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.

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

Your registration is complete when you have registered for courses, paid your fees, and had your photo taken (first term of enrollment only). 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. Permission to register 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.

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. Change of Address forms are available at the Office of the Registrar.

REGISTERING FOR COURSES
The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class meeting times and room numbers, changes to the General Catalog, and the most up-to-date information on registration procedures, including R.S.V.P. (telephone registration).

Class Level
Undergraduate classification is determined by the number of quarter units you have completed:

<table>
<thead>
<tr>
<th>Class</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0.0—44.9</td>
</tr>
<tr>
<td>Sophomore</td>
<td>45.0—89.9</td>
</tr>
<tr>
<td>Junior</td>
<td>90.0—134.9</td>
</tr>
<tr>
<td>Senior</td>
<td>135.0—</td>
</tr>
</tbody>
</table>

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 the approval by the department chairperson, 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 desiring 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 honors 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, 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 stu-
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 advisor 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.

Adding or Dropping Courses

You are officially registered in all courses listed on your individual study list (call R.S.V.P. for information on your official study list) and will be held responsible for completing each of the courses. To adjust your schedule, you must complete an add or drop using R.S.V.P., the telephone registration system, until the published deadlines. See the Academic Calendar in the front of this catalog for final dates each quarter to add or drop courses, and refer to the appropriate Class Schedule and Room Directory for R.S.V.P. procedures, as well as applicable fees and add/drop procedures after R.S.V.P. deadlines.

After published deadlines, permission to change your study list may only be granted by the dean of your college or school and only in special circumstances. Graduate students must have their advisor's approval in order to drop 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.

Retroactive Drops

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 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 Adds

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

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 6 units each quarter in order to be certified as full-time students for insurance and financial aid purposes.

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 failing below this required average will be subject to academic disqualification. 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 death in the immediate family, or an accident.

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 time 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 ten units (including workload units) or fewer per quarter, and graduate students must be registered in six units or fewer per quarter. Minimum progress
requirements are waived for part-time students. A petition, available at the Office of the Registrar, must be approved by the dean of your college (certain verifications are required), and then filed with the Office of the Registrar no later than the tenth day of instruction in the quarter of enrollment. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students.

**ACADEMIC 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 a "Carnegie unit" which assigns one 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 one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-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 registering 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.

**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 UCD. 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 the Admissions Office for evaluation. On your transcript UCD Summer Sessions courses are identified by the letter "S" preceding course numbers.

See the Summer Sessions bulletin for detailed information.

**THE MAJOR**

**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 will result in a hold on your further registra-
Change of Major Accompanied by Change of College

Petitions for a change of major involving change of college must be filed within the first five weeks of the quarter. A change petition, available at the Dean's Office, 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 may submit petitions for a transfer into the College of Engineering from another UCD college only if you 1) are in good academic standing and are making minimum progress, 2) have completed at least 40 units as a registered student on the Davis campus, 3) have successfully completed Mathematics 21A, 21B, and 21C and Physics 9A (or their equivalents) on a letter-grade basis, 4) have a minimum GPA of 2.500 in all mathematics and physics coursework in the Mathematics 21 series and Physics 9A and above, and 5) have the minimum UC GPA specified for the year in which you wish to transfer. Additional restrictions may apply to students who want to major in Civil Engineering.

You must declare a specific major at the time you petition to transfer and must have the minimum GPA specified for transfer into that major in that year. Consult the Engineering Undergraduate Office for details on minimum GPAs for specific majors.

Multiple Majors

College of Agricultural and Environmental Science. 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 also request that your transcript note that you have completed all the requirements for study of a major in addition to your selected major.

College of Engineering. Enrollment in combinations of engineering majors or in an engineering major and a non-engineering 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.

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 towards the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimal number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter and at least two upper division courses in each major must have been successfully completed.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that cannot be approved are two or more majors

1. in the following group: biochemistry, biological sciences, botany, genetics, microbiology, physiology, and zoology.

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, botany, genetics, microbiology, physiology, or zoology.

**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 at least four quarters before you plan to graduate. If you wish to undertake an individual major, request the appropriate form 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 section 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. 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. In order 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 consent of their advisers, develop minors in either the College of Letters and Science or the College of Agricultural and Environmental Sciences. 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 and should be consulted before you begin the minor sequence.

If you are enrolled in the College of Engineering but elect a minor in either the College of Letters and Science or in the College of Agricultural and Environmental Science, you must pick up a minor petition in the office of the college that offers the minor you want, and have it certified by the Undergraduate Office of the College of Engineering.
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 at the beginning of the 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 registered in the course. 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 earlier than the time and date published in the Class Schedule and Room Directory. 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 which 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 learning disabilities may have additional time for examinations (or alternate examination formats). An adjustment request must be submitted in writing to the instructor of the course involved by the tenth day of the quarter, and must include proof of the existence of a learning disability. The instructor determines, in consultation with the student and the campus learning disability specialist, whether an adjustment is necessary and specifies the terms of the adjustment.
Religious Observances. The University of California, Davis seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. It is the responsibility of the student to provide, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the test or examination and to request 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 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 registered in a course. The following grades are used to report the quality of a student's work at UC Davis:

- **A**, excellent
- **B**, good
- **C**, fair
- **D**, barely passing
- **F**, not passing (work so poor that it must be repeated to receive recognition)
- **P**, passed (grade C- or better)
- **NP**, not passed
- **S**, satisfactory
- **U**, unsatisfactory
- **I**, incomplete (work is satisfactory but incomplete for a good cause)
- **IP**, in progress
- **E-NWS**, enrolled—no work submitted

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

Grade Points

Grade points are assigned each letter grade as follows:

- 4.0 = A+
- 3.7 = A−
- 3.3 = B+
- 3.0 = B
- 2.7 = B−
- 2.3 = C+
- 2.0 = C
- 1.7 = C−
- 1.3 = D+
- 1.0 = D
- 0.7 = D−
- 0.0 = F

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 fail 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 can request to take specific courses on a Passed/Not Passed basis. Such requests must be submitted and confirmed before the end of the fifth week 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 1/3 of the units completed in residence on the Davis campus. Consequently, at least 2/3 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 introduced 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 Passed/Not Passed.

College of Engineering: While registered in the College of Engineering, you may register in a maximum of one course per quarter for which you choose the Passed/Not Passed (P/NP) grading option; you must be registered in at least 12 units. Courses that are graded P/NP only may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only courses taken to satisfy (a) the unrestricted electives requirements, or (b) the Humanities–Social Sciences electives (not GE) and (c) the English and rhetoric requirements, or (d) the
technical electives requirement, may be taken on a Passed/Not Passed basis. In addition, certain design courses may be taken on a Passed/Not Passed basis. Consult the Dean’s Office for information about which design courses may be taken on this basis. All other courses must be taken for a letter grade. Humanities—Social Science courses that you plan to offer in fulfillment of the campus General Education requirement must be taken for a letter grade.

You must meet the following conditions to exercise the Passed/Not Passed option:

- be in good academic standing (not on probation or subject to dismissal)
- carry at least 12 units, including the course to be taken P/NP, in that quarter
- have a P/NP petition approved by the Associate Dean for Undergraduate Studies or a designated representative

**College of Letters and Science:** Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petitioning for Passed/Not Passed 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 which otherwise would receive a grade of B+ or better, and in undergraduate courses for work which 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 are available from the Graduate Studies Office and must be signed by your graduate adviser. (See also Individual Study courses.) 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 Not Satisfactory grades. Such courses count toward the maximum number of units graded S allowable toward the degree.

**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 illness, serious personal problems, an accident, a 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, and the grade is not replaced by the end of the third quarter succeeding the quarter in which the I grade was assigned, the I grade will remain on the student’s record.

You may not re-register 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.

**Changes of Grade**

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.

**Repeating Courses**

Undergraduates may repeat any course in which they received a D, F, or NP. Up to a maximum of 16 units, the grades for both the first and second time a course is taken will appear on the student’s transcript, but only the grade earned the second time a course is taken will be calculated into the student’s GPA. After the 16-unit maximum is reached, the grades for both the first and second time a course is taken will be calculated into the student’s GPA. However, the units completed after the 16-unit maximum is reached are credited toward the student’s degree only once.

Repeat units of English A are not counted against the 16-unit maximum. Courses in which students received a grade of D or F may not be repeated on a P/NP basis. (Courses in which a grade of NP was received may be repeated on a P/NP basis.)
Departments may restrict the repetition of a course if it is a prerequisite to a course that the student has already completed with a grade of C- or better. Repeating a course more than once requires approval by the appropriate college dean.

Graduate students may repeat any course in which they received a C, D, F, or U. Up to a maximum of 9 units, only the grade earned the second time a course is taken will appear on the student’s transcript. After the 9-unit maximum is reached, the grades for both the first and second time a course is taken will appear on the student’s transcript. However, the units completed after the 9-unit maximum is reached are credited toward the student’s degree only once.

A course in which a C, D, or F grade has been earned may not be repeated on the S/U basis. Courses in which a grade of U was received may be repeated on an S/U basis.

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. If you wish to have your grades mailed to you, bring in a stamped, self-addressed envelope with your student I.D. card to the Office of the Registrar before the end of the quarter.

Transcripts

A record of each student’s academic work at UCD 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. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 1333 Research Park Drive. Transcripts of work completed at another campus of the University or at another institution must be requested directly from the campus or institution concerned.

Application for a transcript of record should be made at least two weeks in advance of the time needed.

HONORS AND PRIZES

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 the preceding quarter. Honors lists will be posted quarterly on bulletin boards outside deans’ offices, and a notation of these honors will be placed on each student’s permanent record by the Office of the Registrar.

Scholarships

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. Information about scholarships is available from the Scholarship Office, 207 North Hall, 916-752-2393.

Graduation Honors

Honors at graduation are awarded to students who have a grade-point average in the top percent of their college or school 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.)

<table>
<thead>
<tr>
<th>Total Quarter Units Completed</th>
<th>Highest Honors</th>
<th>High Honors</th>
<th>Honors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>at UC</td>
<td>45-89</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>90-134</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>135+</td>
<td>4%</td>
<td>4%</td>
<td>8%</td>
<td>16%</td>
</tr>
</tbody>
</table>

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 1993. These averages will be used through winter 1994.

<table>
<thead>
<tr>
<th>Percent Determining Cut-Off Point</th>
<th>Agricultural and Environmental Sciences</th>
<th>Engineering</th>
<th>Letters and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>3.635</td>
<td>3.637</td>
<td>3.645</td>
</tr>
<tr>
<td>3%</td>
<td>3.782</td>
<td>3.793</td>
<td>3.799</td>
</tr>
<tr>
<td>4%</td>
<td>3.727</td>
<td>3.758</td>
<td>3.763</td>
</tr>
<tr>
<td>6%</td>
<td>3.660</td>
<td>3.692</td>
<td>3.697</td>
</tr>
<tr>
<td>8%</td>
<td>3.591</td>
<td>3.627</td>
<td>3.642</td>
</tr>
<tr>
<td>12%</td>
<td>3.491</td>
<td>3.497</td>
<td>3.548</td>
</tr>
<tr>
<td>16%</td>
<td>3.401</td>
<td>3.422</td>
<td>3.464</td>
</tr>
</tbody>
</table>

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 for all courses as described in the above table. Students who complete the College Honors Program and who meet the grade-point requirement for graduation with honors may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. 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 is designed to permit 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 coursework for the project.

Prizes
The University Medal is the highest 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.

College of Engineering. Each year outstanding senior students in engineering are recommended by the faculty of the College as nominees for the College of Engineering 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.

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 Epsilon (Agricultural Engineering)
- Alpha Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Delta Phi Alpha (German)
- Dobro Slovo (Russian)
- Golden Key (All colleges and schools)
- Kappa Omicron Nu (Applied Behavioral Sciences)
- Omicron Delta Epsilon (Economics)
- 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 Alpha Xi (Environmental Horticulture)
- Pi Delta Phi (French and Italian)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanean Honor Society (All colleges and schools—women only)
- Psi Chi (Psychology)
- Sigma Pi Sigma (Physics)
- Sigma Xi (All colleges and schools—research)
- Tau Beta Pi (Engineering)

Withdrawals and Leaves of Absence
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 are available at the Office of the Registrar. Information on fee refunds can be found in the Fee Refund section of this catalog. The following signatures are required on withdrawal petitions: director of the Student Health Center; adviser, lab or course instructor; Student Aid Accounting Office; Cashier’s Office; and the dean of your college, division, or school.

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.

Planned Educational Leave Program (PELP)
The Planned Educational Leave Program allows students to suspend academic work, leave the campus, and later resume studies 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. Freshmen and transfers who have been admitted but have not yet registered or attended classes are also eligible, providing an opportunity for beginning students to pause between high school or community college and the University.
To apply for PELP, file an application, including a brief written explanation of the reason for leaving the campus, and stating when you intend to resume academic work. Applications for Planned Educational Leave are available at the Office of the Registrar and should be filed with the Office of the Registrar (Admissions Office for new students) no later than the tenth day of instruction.

A fee of $40 is charged, payable when you enroll in the 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 normal maximum leave is one full academic year. You may, however, request extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the tenth day of instruction in a quarter. You should be entitled to a partial refund of fees paid. (See Fee Refunds.)

Students enrolled in the program are expected to devote their leave period to non-classroom activities. Students on Planned Educational Leave are not eligible to register in concurrent courses on the Davis campus and may not earn academic credit at Davis during the period of the leave.

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.

**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.

A student will be placed on probation 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. - 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 (GPA) is less than 1.5 for the quarter.
- the student has attempted more than 16 units graded I (Incomplete).
- 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 quantitative 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. 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. 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 death in the immediate family, or an accident.

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. The notation "minimum progress—subject to academic disqualification," will be noted on the grade report first time the total number of units passed at UCD 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.

It is assumed that a student will earn the 180-unit minimum degree requirement prior to completing 15 quarters of enrollment. Normal progress would achieve 180 units in 12 quarters.

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 during Summer Sessions at UCD or at another accredited school and transferred to UCD will be counted as units passed (applied to 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 examination is taken)
- Courses that are IP (in progress) will be counted as units passed
SUMMER SESSIONS

Information:
44 Mrak Hall
916-752-1641

Summer time affords students the opportunity to accelerate progress toward a degree, to tackle problem courses and meet prerequisites, to take special study courses, or to do research. Although it is possible to complete up to 24 units by attending both summer sessions, 7 units per session is an average load.

Summer Sessions at Davis offers a wide variety of lower division and upper division courses that provide full University credit. Admission is open to all university students, high school graduates, and other qualified applicants; however, admission to a summer session does not constitute admission to the University's regular sessions.

In 1994 there will be two six-week sessions at UC Davis: June 27 through August 5, and August 8 through September 16. The Summer Sessions Bulletin and application materials are available in mid-March and may be obtained by writing to the address above.

Special international programs are offered each summer with admission open only to UC registered students. Last year, students had the opportunity to study in Chile, Great Britain, Italy, and Japan. For information on international programs scheduled for 1994, call 916-752-0435.

- 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. See your faculty adviser or go to the Dean's Office of your college if you need academic advising about probation and dismissal.

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.

Transfer with Scholastic Deficiencies

To transfer from one University 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.
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 are required to complete a certain number of courses in the two areas of General Education other than the one that contains their major field.

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.

UNIVERSITY 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 600 or higher on the College Board Achievement Test in English Composition.
- By achieving a grade of 5, 4, or 3 in 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 passing with credit the California State University and Colleges English Equivalency Examination. (Note: the CSUC English Placement Test may not be used to satisfy the Subject A requirement.)
- By writing a passing essay on the Subject A Examination. This examination may be taken only once. 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 UCD campus during the orientation period each quarter. For the time and location consult the Fee Payment, Registration, and Orientation Information bulletin, published before the beginning of each quarter.

If you have not satisfied the requirement in one of the ways described above, you must register in English A during your first quarter of residence at the University, or as soon thereafter as space is available in the course. If the requirement has not been satisfied by the end of your third quarter of registration, a hold will be placed on your registration. The English A course must be taken for a letter grade and passed with a grade of C or higher. Students receiving a grade of C– or lower must repeat the course. This 2-unit course counts as 4 units on your study load and toward minimum progress.

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 the following ways:

- By offering one high school unit in American history, or ½ high school unit in American history and ½ 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 Studies 10, 100, 120, 121
  - Asian American Studies 1, 2
  - Economics 111A, 111B
  - 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 that apply for prerequisites and majors.)

- By presenting evidence that the requirement has been accepted 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 the Davis campus.
- 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 the Office of Admissions. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.

**Residence Requirements**

The minimum residence requirement for a bachelor’s degree at the University of California is one academic year (three quarters). 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. 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 18 of these 35 quarter units may be completed in summer session courses at UCD.

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.

**Filing for 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.

**College of Agricultural and Environmental Sciences**

A Major Certification form must be received and evaluated by the Dean’s Office before your candidacy for a degree can be finalized. A Major Certification is completed during the quarter a student plans to graduate. At that time, the adviser and student 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.

**GENERAL EDUCATION REQUIREMENT**

The General Education Program promotes the intellectual growth of all undergraduates. The program’s objectives are: (1) to offer a choice of courses in all major fields of learning; (2) to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; (3) to involve students in the learning process by requiring considerable writing and participation in class activities; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.
In designing the UC Davis General Education Program, the faculty specified that General Education courses should help students acquire skills that will serve them well beyond their undergraduate years. General Education (GE) courses are designed to encourage development of analytical reasoning and clear communication skills through active participation in the classroom. GE courses stress understanding of intellectual concepts and methods, connect their subject with other fields of knowledge, and discuss the social, ethical and aesthetic issues raised by their inquiry. In order to break away from traditional ways of categorizing the broad fields of inquiry and in order to encourage interdisciplinary connections, GE courses are grouped into three broad areas of knowledge:

1. **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.

2. **Contemporary Societies.** Courses in this area create an awareness of critical economic, political, and social problems of the contemporary world.

3. **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.

GE courses may be either lower division or upper division. Courses numbered 0-99 are lower division and courses numbered 100-199 are upper division. You should consult the course descriptions contained in the Programs and Courses section of this catalog for the courses designated as prerequisite for upper division courses.

**Determining Your General Education Requirement**

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.

Each academic major, minor, and degree program has been assigned to one of the three areas of General Education. Each GE course has also been assigned to one of the three areas. You must complete courses in those areas of General Education other than the one that contains your major field.

A minor in an area outside the area of your major will satisfy your GE requirement in that minor's area. 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 to not reduce your GE requirements.

If you have an approved individual major, it should have been assigned to one of the three General Education areas at the time it was 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.

The specific General Education requirements for students entering UCD from the 1984-85 academic year and thereafter are detailed in the General Education Requirements table on the following page.

**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:

- UCD Extension courses if they are accepted for transfer by the Office of Undergraduate Admissions.
- Advanced Placement credit.
- Transfer work from other community colleges and four-year institutions.

UCD 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 UCD Summer Session before entry, however, will count toward satisfaction of the GE requirement.

Consult the "Transfer Credit Evaluation" form prepared by the Office of Undergraduate Admissions to determine your transfer credits.

You are exempt from the UCD General Education Requirement if

- you come from a California community college or other institution of higher education and have completed the "Transfer Core Curriculum;"

**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.

**Fulfilling Your General Education Requirement**

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 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, Psychology 15-16, and Music 3A-3B.

If you completed a GE course before fall 1986 on a Passed/Not Passed basis or before having completed Subject A, you will receive GE credit for that course.
Approved General Education Clusters

General Education "clusters" are groups of closely related introductory GE 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.

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.

Selecting General Education Courses

Since GE courses must be chosen from the two areas of General Education other than the one containing your major field, you must begin by identifying the area of General Education to which your major has been assigned. The following list provides this information.

---

<table>
<thead>
<tr>
<th>Academic Year of Entrance to UCD</th>
<th>Freshman or transfer student with 40 or fewer transfer units</th>
<th>Transfer student with more than 40 but fewer than 84 units</th>
<th>Transfer student with 84 or more units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-85</td>
<td>2 GE courses:</td>
<td>4 GE courses:</td>
<td>6 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• may be in same or different areas;</td>
<td>• may be in the same or different areas;</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td></td>
<td>• may be introductory or non-introductory</td>
<td>• may be introductory or non-introductory</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td>1985-86</td>
<td>4 GE courses:</td>
<td>2 GE courses:</td>
<td>6 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• maximum of 3 in one area;</td>
<td>• may be in the same or different areas;</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td></td>
<td>• maximum of 2 introductory</td>
<td>• may be introductory or non-introductory</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td>1986-87</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>6 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• 2 courses in each of two areas;</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td></td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
<td>• only 1 course in each area may be introductory Option 2: 3 courses in one area and 1 in the other;</td>
<td>• must have 1 introductory and 2 non-introductory courses in each area</td>
</tr>
<tr>
<td>1987-88 to 1991-92</td>
<td>Same as for 1986-87</td>
<td>Same as for 1986-87</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Option 1: 1 course in each of two areas:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• both courses must be non-introductory</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Option 2: 3 courses in one area:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• must have 1 introductory and 2 non-introductory courses</td>
</tr>
<tr>
<td>1992-93, and thereafter</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• 2 courses in each of two areas;</td>
<td>Option 1: 1 course in each of two areas:</td>
</tr>
<tr>
<td></td>
<td>• at least 1 upper division course in each area;</td>
<td>• at least 1 course in each area must be upper division;</td>
<td>• both courses must come from the list of certified GE courses;</td>
</tr>
<tr>
<td></td>
<td>• at least 2 of the 3 courses in each area must come from the list of certified GE courses;</td>
<td>• at least 1 course in each area must come from the list of certified GE courses;</td>
<td>Option 2: 3 courses in one area:</td>
</tr>
<tr>
<td></td>
<td>• the third course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>• the second course in each area may come from a list of courses approved for GE credit by your college</td>
<td>• at least 1 course must be upper division;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 2 courses must come from the list of certified GE courses;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1 upper division course in the other area, which must come from the list of certified GE courses.</td>
</tr>
</tbody>
</table>

---

¹ For the academic years 1984-85 through 1986-87, this category of GE requirements applied to freshmen or transfer students with fewer than 41 units; the unit cut-off was changed fall 1987.

² For the academic years 1984-85 through 1986-87, this category of GE requirements applied to transfer students with 41 or more but fewer than 84 units; the unit cut-off was changed fall 1987.
Civilization and Culture (CC)
American Studies
Art History
Art Studio
Chicano Studies
(Classical Civilization
Comparative Literature
Design
Dramatic Art
East Asian Studies
English
French
German
Greek
History
Italian
Latin
Linguistics
Medieval Studies
Music
Philosophy
Religious Studies
Rhetoric and Communication
Russian
Spanish

Contemporary Societies (CS)
African-American and African (Afro-American) Studies
Agricultural and Managerial Economics
Agricultural Systems and Environment
Anthropology (A.B. degree)
Applied Behavioral Sciences
Asian American Studies (non-degree program)
Chicano Studies (Sociology emphasis)
Economics
Environmental Biology and Management
Environmental Policy Analysis and Planning
Geography (A.B. degree emphasis I, II, III, V)
Human Development
International Agricultural Development
International Relations
Native American Studies
Political Science
Political Science—Public Service
Sociology
Sociology—Organizational Studies
Textiles and Clothing
Women’s Studies

Nature and Environment (NE)
Animal Science
Animal Science and Management
Anthropology (B.S. degree)

Applied Science
Atmospheric Science
Avian Sciences
Biochemistry
Biological Sciences
Chemistry
Community Nutrition
Computer Science
Dietetics
Engineering (all majors)
Entomology
Environmental and Resource Sciences
Environmental Toxicology
Fermentation Science
Fiber and Polymer Science
Food Biochemistry
Food Science
Genetics
Geography (B.S. degree; A.B. degree emphasis IV)
Geology
Mathematics
Microbiology
Nutrition Science
Physical Education
Physics
Physiology
Plant Biology (Botany)
Plant Science
Psychology
Range and Wildlands Science
Soil and Water Science
Statistics
Wildlife and Fisheries Biology
Zoology

Approved General Education Courses
A list of the courses and course sequences which have been approved for offering under the General Education Program appears on the following page. This listing is subject to change. You should check the Class Schedule and Room Directory each quarter for the most current information.
GENERAL EDUCATION COURSES FOR 1993-94

Note: This list contains approved GE courses for the current academic year only. 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
Lower Division
American Studies 1B, 1E
Art History 1A/1AG, 1B/1BG, 1C/1CG, 1D/1DG, 25/25G*
Chinese 11
Classics 4, 15, 17A, 17B, 17C, 20, 50
Comparative Literature 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 20, 25, 53B
English 3, 4
French 25
German 48, 50, 52A, 52B, 52C
History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 30, 72A, 72B
History & Philosophy of Science 20
Integrated Studies 2B*, 2D*, 3B*, 3C*, 8B*
Italian 50
Landscape Architecture 40
Linguistics 1, 50
Medieval Studies 20A, 20B, 20C
Music 3A-3B*, 10
Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 31
Political Science 4
Religious Studies 3A, 21, 23, 40
Russian 44
Viticulture and Enology 3

Civilization and Culture
Upper Division
Art History 178C
Chinese 110
Classics 140, 141, 143, 150
Dramatic Art 156, 157
Education 120
English 118, 127, 156, 162, 171A, 171B, 182, 184
French 112, 113, 114
History and Philosophy of Science 130A, 130B
Italian 140, 141, 142
Landscape Architecture 140
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
Rhetoric and Communication 110
Russian 130, 131, 151, 166
Spanish 149
Veterinary Medicine 170

Contemporary Societies
Lower Division
American Studies 1A
Anthropology 2, 4
Applied Behavioral Sciences 2
Chicano Studies 40
Economics 1A-1B*
Environmental and Resource Sciences 10-10G*
Environmental Studies 10
Geography 2-2G*, 5-5G*
History 10, 72B
Human Development 15
Integrated Studies 3A, 3D, 3E, 8C
International Agricultural Development 10
Native American Studies 10, 55, 70
Political Science 1, 2
Psychology 15-16*
Religious Studies 1, 2
Sociology 2, 3, 4, 25
Women's Studies 50

Contemporary Societies
Upper Division
African-American and African Studies 100, 133
Agricultural Economics 120, 141, 141M
American Studies 120, 130
Anthropology 101, 117, 124, 129, 130, 133, 178
Applied Behavioral Sciences 151, 153, 154, 178
Chicano Studies 132
Consumer Science 100
Education 110, 122, 132
Engineering 160
Engineering: Applied Science 137
Engineering: Civil and Environmental 160
Environmental Studies 101, 133, 161, 166
Geography 124, 150 170
History 165, 188B
Linguistics 113
Native American Studies 115, 130C, 180
Philosophy 118
Physics 137, 160
Psychology 175, 177
Russian 132
Textiles and Clothing 107
Veterinary Medicine 170

Nature and Environment
Lower Division
Agricultural Systems and Environment 1-1G*
Animal Science 1, 2, 42
Anthropology 1, 15, 23
Astronomy 10
Atmospheric Science 10
Avian Sciences 11, 13
Biological Sciences 10
Chemistry 2A-2B*, 10
Engineering 20
Engineering: Civil and Environmental 30
Engineering: Computer Science 15
Entomology 17
Environmental and Resource Sciences 2, 3-3G*
Environmental Studies 30-30G*
Food Science and Technology 2
Geology 1-1G*, 3-3G*, 43
Human Development 19
Integrated Studies 1A, 1B, 8A
Microbiology 20
Molecular and Cellular Biology 10
Nutrition 10-11, 20
Philosophy 31
Physics 10
Plant Biology 10
Plant Science 10
Pomology 10
Soil Science 10
Statistics 10
Viticulture and Enology 3
Wildlife and Fisheries Biology 10

Nature and Environment
Upper Division
Anthropology 152, 153
Engineering 160
Engineering: Applied Science 137
Entomology 111, 119, 147, 153
Environmental and Resource Sciences 121, 131
Environmental Studies 116-116G*
Evolution and Ecology 138
Fiber and Polymer Science 110
Geology 113-113G*, 116-116G*, 131, 135, 144
History and Philosophy of Science 130A, 130B
Landscape Architecture 155
Philosophy 108
Physics 137, 160
Plant Biology 101
Plant Pathology 140
Plant Science 104
Water Science 100

*These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.

**This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.

*3 These courses may be taken concurrently, if offered, or sequentially (10 then 11).

*4 These courses in Integrated Studies are open only to students in the Integrated Studies program.
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.

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 UCD from a community college, state college, or university, you may follow the requirements as stated in any UCD 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.

Study Plan Approval
A Study Plan provides for attainment of specific long-term goals and should allow for (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulation (see the Academic Information section).

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 will 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.
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 84 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.

If you are admitted with 84 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.

Subject Areas

<table>
<thead>
<tr>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations, linear algebra, vector analysis)</td>
</tr>
<tr>
<td>Physical and biological sciences (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students)</td>
</tr>
<tr>
<td>Engineering (lower division subjects such as graphics, properties of materials, surveying, computer programming, dynamics, statistics, and circuit theory. These courses must include statics, dynamics, circuits and FORTRAN (for all majors but Electrical Engineering and Computer Science) or Pascal (for Electrical Engineering and Computer Science majors). Students majoring in Mechanical, Aeronautical, Materials Science, Civil, Electrical or Computer Science Engineering, 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 9 units of engineering in their lower division programs)</td>
</tr>
<tr>
<td>Written and oral expression (courses that are equivalent to English 1 or 3, and Rhetoric and Communication 1 or 3)</td>
</tr>
<tr>
<td>Humanities–Social Sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study)</td>
</tr>
<tr>
<td>Unspecified subjects (Chemical Engineering majors should cover quantitative analysis and one course in organic chemistry with laboratory during their sophomore year)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

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.

The minimum number of required units in the Lower and Upper Division Programs varies, with the curriculum, from 180 to 188.

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 solving 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.

Credit in University Extension Courses. Appropriate courses taken under University Extension may be used for degree credit. Simultaneous registration in resident courses and Extension courses requires prior approval by the Associate Dean for Undergraduate Studies of the
Electives

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.

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 from subjects in the humanities and social sciences. 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. 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 designed 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:

- Agricultural Economics 1, 100A, 100B, 120, 141, 141M, 150, 169
- American Studies 1A, 1B, 1C, 1E, 1F, 2, 45, 101A-H, 110, 120, 125, 130, 151, 152, 153
- Anthropology 2, 3, 4, 25, 101, 110 through 114, 117 through 149, 170 through 179
- Applied Behavioral Sciences 1, 2, 17, 18, 118, 140, 151 through 154, 157, 161 through 164, 170, 171, 172, 174 through 178, 190
- Art History 1A, 1B, 1C, 1D, 10H, 10S, 15, 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)
- Asian American Studies 1, 2, 20, 100, 101, 110, 111, 112, 130, 150, 155
- Chicano Studies 10, 20, 70, 102, 121, 130, 132
- Chinese 10, 11, 104 through 109A-I, 111 through 116, 130, 131, 132, 140, 160

Residence Requirement

In addition to 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 Engineering coursework.

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 84 quarter units, you may satisfy this requirement by

1. completing an English 102 adjunct to an approved upper division course in the College of Engineering with a grade of C– or higher; or
2. by completing 3 units of English 104 with a grade of P (Passed).

This requirement is in addition to the expository writing course requirement (English 1 or 3, or Comparative Literature 1, 2, or 3) specified in the Lower Division Programs.

During the 1993-94 academic year, the English Composition Examination will be offered on the following three Saturdays: October 30, January 29, and April 30. Sign-up rosters will be posted on the College of Letters and Science’s bulletin board, Mira Hall foyer, Monday through Thursday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by Thursday. 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.
Comparative Literature 1 through 53B, 135 through 170
Consumer Science 100
Design 140, 142A, 142B, 143, 144
Dramatic Art 15 (but not 15L), 20, 115, 150 through 159
East Asian Studies 113
Economics 1A-1B, 100, 101, 103, 105, 106, 110A through 136B, 151A through 175
Education 110, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 153
Environmental Studies 101, 133, 160 through 162, 164 through 167, 169
French 25, 45, 101, 102, 103, 107, 112 through 123, 140, 141, 162
Geography 2, 5, (2G, 5G when taken concurrently with
2 or 5), 6, 10, 50, 104, 120 (but not 120L), 121, 122A
through 127, 141 through 162, 168, 170 through 173, 175
German 48, 50, 51, 52, 106, 110 through 133, 140, 141,
142C, 160, 165, 176, 185
History 1 through 86, 101 through 104A, 110 through 191B, 193 through 196B
History and Philosophy of Science 20, 130A, 130B, 150
Human Development 15, 19, 100A through 103, 110,
130, 131, 132, 151, 160
Integrated Studies 1A, 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C,
3D, 5A, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)
International Agricultural Development 10, 103
Italian 25, 50, 107 through 145
Japanese 10, 15, 25
Landscape Architecture 140
Linguistics 1, 100, 102, 113, 115, 120, 135, 138, 150
Medieval Studies 20A, 20B, 20C, 120A-F
Music 3A, 3B, 4A, 4B, 4C, 5A, 5B, 5C, 10, 24A through
28, 109, 110A, 110B, 110C, 110D, 121, 122, 129
Native American Studies 1, 10, 32, 33, 55, 70, 101
through 191
Nutrition 20, 118
Philosophy 1, 10A-G, 13, 14, 17, 21, 22, 23, 24, 100
through 111, 114A through 127, 137, 143 through 177, 190
Physical Education 36A, 36B
Political Science 1 through 7, 100 through 113, 115
through 191
Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132,
135, 136 through 150, 165, 168, 171, 175, 177, 183
Religious Studies 1 through 75, 100 through 178A-E
Rhetoric and Communication 103 through 145, 152
Russian 41, 42, 44, 120 through 154, 166
Scandinavian 110, 111
Sociology 1, 2, 3, 25, 107 through 185
Spanish 24, 34, 35, 100, 103A through 109, 111
through 129, 134, 135, 136, 138, 140, 149, 150, 151
Textiles and Clothing 107
Women's Studies 50, 60, 80, 100, 102

General Education electives are used to satisfy a campus requirement and are chosen from the General Education Courses for 1993-94 list earlier in this chapter. Since all engineering majors are in the Nature and Environment GE area, you must fulfill the campus requirement by taking courses in the Civilization and Culture and Contemporary Societies areas which broadly overlap Humanities and Social Sciences, respectively.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) coursework 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 general, a good academic strategy is to satisfy the campus GE requirement first and then to satisfy any remaining HSS requirements by taking courses from the HSS list. In this way, you can benefit from the breadth and depth of course coverage inherent in the GE program structure. (For example, courses from areas outside of your major field of study are required and you must take coursework at both the lower division and upper division levels.)

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 begin your GE coursework. 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 up to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198, and 199. Academic credit for 199 courses is limited to a maximum of 5 units for each substantially different project. Academic credit for engineering internship courses (192s) is 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 chemistry, engineering, mathematics, physics and statistics courses, the following courses may be taken as technical electives:

Agricultural Economics 100A, 100B, 113, 118A, 118B,
140, 147, 148, 155, 157, 171A, 171B, 175, 176
Animal Science 41, 41L, 104, 105
Applied Biological Systems Technology 161, 163
Art Studio 121A
Atmospheric Science 121A, 121B, 124, 128, 133, 149,
158
Biological Sciences 1A, 1B, 1C, 101, 103, 104, 120,
120P, 121, 121P, 122, 122P
Chemistry 2C, 2CH, 5, 8A, 8B
Economics 140  
Environmental and Resource Sciences 100  
Environmental Biology and Management 110  
Environmental Toxicology 101, 131, 135, 155  
Fiber and Polymer Science 100, 150, 161, 161L  
Geology 17, 50, 50L, 105, 117A, 117B, 134, 150A, 150B, 150L, 152  
Management 11A, 11B  
Microbiology 102, 102L, 130A, 130B, 130L, 177, 177L  
Molecular and Cellular Biology 160L, 161, 170L  
Neurobiology, Physiology and Behavior 2, any upper level course  
Soil Science 100, 102, 107, 111, 118, 120  
Vegetable Crops 101, 105, 118 (any upper level course except 150 or 190–199)  
Water Science 103, 104, 122, 150, 180  
Wildlife and Fisheries Biology 100, 102, 110, 110L, 111, 111L, 120, 120L, 121, 122, 130, 131, 136, 140, 151, 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, normally 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 10 units of chemistry 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 1-1G, 3-3G, 43, 113-113G, 116-116G, 131, 135, 144  
Microbiology 20  
Physics 137, 160  
Plant Biology 191  

Electrical Engineering and Computer Engineering students should also use this list to identify the courses to satisfy the mathematics/science electives. To identify additional courses that may also satisfy this requirement, please refer to the Electrical Engineering and Computer Engineering curriculum outline.

Degree Requirement Statements

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.

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 degree check for you (preferably at the end of your junior year). To have this degree check prepared, submit a signed Degree Check Request and request an appointment. You can get further information concerning this service and the forms for requesting a degree check in the Engineering Undergraduate Office.
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 upper division units which include 48 units from Letters and Science teaching departments and programs. For the A.B. degree, a minimum of 12 of 48 units of upper division Letters and Science courses must be from outside the major department or program (see Area Requirement, A.B. degree entry, in this section for exceptions). All upper division General Education courses will be accepted in satisfaction of this latter requirement. Nonstandard courses (see Area Requirement, A.B. degree entry, in this section) do not count toward these 12 units.

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 only 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 course registration materials can be made available to you 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 for 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 unlimited number of units in graduate 200 series courses and up to a combined total of 9 units in 300 and 400 series professional courses toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the dean—must be obtained by petition in order to receive credit toward the degree for the following kinds of courses:

• all graduate courses 200–298 whether offered by a department or program outside of or within the College of Letters and Science
• all professional courses 300–398 for teachers offered outside of the College of Letters and Science
• all postgraduate professional courses 400–498 offered outside of the College of Letters and Science
• all variable unit courses 300–398 and 400–498 offered within the College of Letters and Science

B. The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade-point average of 3.3 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 UCD, whichever is the smaller. (Note the separate unit limits on internship, special study, and tutoring courses; and major limitations.)

Physical Education 1: 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 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. Only grades earned in courses taken at UCD 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, 20, Comparative Literature 1, 2, or 3;
   and
   b. English 102 or 103 (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, 20, 103A-G, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the English Composition requirement. Note that English 103 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 102 or 103 at UC Davis.

English Composition Examination. This academic year, the no-fee examination will be offered on the following Saturday mornings:

   October 30, 1993
   January 29, 1994
   April 30, 1994

There are no examinations administered during the summer.

Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mrak Hall foyer, Mon-
day through Thursday (or until filled) just before each Saturday examination date.

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 requirements 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.

Twelve units of upper division courses must be completed in Letters and Science teaching departments other than the major department or program. Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the 12-unit requirement. Not more than 10 units in special study courses (194H, 199) may be counted. Students pursuing A.B. degree major programs with a strong upper division interdepartmental emphasis—Biological Sciences, Comparative Literature, East Asian Studies, International Relations, and Sociology/Organizational Studies—may be exempted from the 12-unit requirement.

B.S. degree—a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement.

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area 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 as follows:

**Natural Sciences and Mathematics**

- Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158
- Astronomy
- Avian Sciences 13
- Biological Sciences: All courses except 19
- Chemistry
- Engineering 20
- Engineering: Civil and Environmental 30
- Engineering: Computer Science 10, 30, 32, 40, 100, 110, 120, 122, 140, 170
- Engineering: Electrical and Computer Science 171
- Entomology 10, 100
- Environmental and Resource Sciences 2, 131
- Environmental Studies 30
- Evolution and Ecology
- Food Science and Technology 2
- Geography 1, 3, 102, 108, 110, 112, 115, 116, 117, 118, 162
- Geology
- Human Anatomy 101
- Integrated Studies 1A, 1B, 8A
- Mathematics
- Microbiology
- Molecular and Cellular Biology
- Neurobiology, Physiology and Behavior
- Nutrition 10
- Physical Education 101, 102, 103, 110, 111, 112, 113, 115
- Physics
- Plant Biology
- Statistics
- Textiles and Clothing 110
- Wildlife and Fisheries Biology 10

**Foreign Language Requirement (A.B. and B.A.S. degrees)**

A.B. and B.A.S. degrees—the 15-unit level or the equivalent in one language.

B.S. degree—none.

**Acceptable Languages.** The Foreign Language requirement may be satisfied in any language offered at UCD, 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 Status Card, which is issued by the Dean’s Office within a quarter after admission.

2. **College Board Achievement Test.** Earning a qualifying score of at least 550 on a College Board Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at the Undergraduate Admissions Office, 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. degree—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S. degree—as 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 passing or nonpassing grade will be charged to your P/NP option, no petition is required. [See "Passed/Not Passed (P/NP) Grading" in the Academic Information section.]

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 appropriate foreign language department.

**Major Program Requirements**

Requirements for major programs are described in the Programs and Courses section of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College’s Committee on Individual Majors.

No more than 6 units in internship courses (numbered 92, 192, or similar internship courses), may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T, and 197TC do not satisfy unit or course requirements in the major.
Change in Requirements

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University and College requirements (see General Education requirement for an exception) as stated in any UCD General Catalog in effect at any time you were registered in a postsecondary institution of higher education (i.e., community college, college, or university). Once you have chosen the year of the General Catalog under which you wish to be governed, you must satisfy all of the University and College requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.

Degree Check

Before the beginning of your senior year, take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and to ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the Letters and Science Advising Office provides informational materials and instructions on how to evaluate your progress on College and University requirements. You should also obtain a check of major requirements from your faculty adviser.

When you have completed 135 units of degree credit, a hold will be placed on your registration materials, requiring that you contact the Letters and Science Advising Office and your faculty adviser for a degree check. The Letters and Science Advising Office will provide each student with one official degree check summarizing your progress in fulfilling College and University requirements. You may request this degree check anytime during your final four regular quarters of registration before graduation.
Graduate Studies offers advanced degrees in more than 80 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 UCD's 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 UCD in the front of this catalog.

Graduate study and research are 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 compa-

rable 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.

UCD 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.

### DEADLINES

<table>
<thead>
<tr>
<th>Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of Graduate Studies</th>
<th>FALL 1993</th>
<th>WINTER 1994</th>
<th>SPRING 1994</th>
<th>FALL 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States residents</td>
<td>June 1</td>
<td>Apr. 1</td>
<td>June 1</td>
<td>Apr. 1</td>
</tr>
<tr>
<td>International students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deadline for filing applications for readmission to graduate status with Graduate Studies</td>
<td>Aug. 2</td>
<td>Nov. 1</td>
<td>Feb. 3</td>
<td>Aug. 3</td>
</tr>
<tr>
<td>Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the Dean of Graduate Studies</td>
<td>Sept. 24</td>
<td>Jan. 7</td>
<td>Feb. 25</td>
<td>June 1 (for Sept.'94) Oct. 1 (for Dec. '94)</td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file theses to the committee in charge</td>
<td>Nov. 1</td>
<td>Feb. 1</td>
<td>May 2</td>
<td>July 22 (for Sept. '94)</td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file theses with the Dean of Graduate Studies</td>
<td>Dec. 2</td>
<td>Mar. 2</td>
<td>June 1</td>
<td>Sept. 2 (for Sept.'94)</td>
</tr>
<tr>
<td>Deadline for candidates for master's degrees to file final report on comprehensive examination with the Dean of Graduate Studies</td>
<td>Dec. 17</td>
<td>Mar. 24</td>
<td>June 17</td>
<td>Sept. 16</td>
</tr>
<tr>
<td>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</td>
<td>Aug. 13</td>
<td>Nov. 12</td>
<td>Feb. 5</td>
<td>May 20 (for Sept.'94) Aug. 12 (for Dec. '94)</td>
</tr>
<tr>
<td>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</td>
<td>Oct. 1</td>
<td>Jan. 4</td>
<td>Apr. 1</td>
<td>July 1 (for Sept.'94)</td>
</tr>
<tr>
<td>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</td>
<td>Dec. 2</td>
<td>Mar. 2</td>
<td>June 1</td>
<td>Sept. 2 (for Sept.'93)</td>
</tr>
</tbody>
</table>
APPLYING FOR ADMISSION

Applications are accepted for fall quarter only. Combined admission and fellowship application forms are available from Graduate Studies, University of California, Davis, CA 95616. 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 employment as a teaching or research assistant or of receiving financial support are greatly enhanced by applying early. The application deadline is June 1, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

The completed application form, along with the $40 nonrefundable application fee and official transcripts from each college and university you have attended must be sent directly to Graduate Studies. Supplemental application materials required by the graduate program must be sent directly to the graduate adviser for that program.

When all application materials have been received by Graduate Studies, they will be forwarded to your proposed major program where they will be evaluated along with the supplemental materials you have sent to the program adviser. 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

If you were formerly registered at UCD as a graduate student and wish to return to the same degree program and major, you must apply for readmission and pay the readmission application fee of $40 at least eight weeks before the beginning of the quarter in which you plan to register (see the Academic Calendar at the front of this catalog). 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 along with the nonrefundable $40 application fee must be received from international students by April 1, unless your proposed program has an earlier deadline.

**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, CB6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550.

Visas. If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program (see under "International Student Services" in the Academic Advising section 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.

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 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 your 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 field. It is not awarded merely for the 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 campus of the University—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 your 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, you may repeat the examination one time.

After successful completion of the Qualifying Examination, you must file for Advancement to Candidacy for the degree. At this time, a committee is appointed to direct your 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: Feminist Theory & Research, International Nutrition, Computational Science, Critical Theory, 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 at the Office of the Dean of 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

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants for admission who wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the fall quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with the chairperson of your graduate program on or before January 15. International students are not eligible for fellowship consideration until they have completed one year as a graduate student at UC Davis. Information regarding graduate fellowships, which are supported by various federal and outside agencies, is available at Graduate Studies.

A limited number of Nonresident Tuition Fellowships are awarded each year to new nonresident U.S. citizens, permanent residents of the U.S., and continuing international students based on academic merit. The available fellowships are allocated to graduate programs which choose individual recipients from among their graduate students. A minimum grade-point average of 3.25 is required for eligibility. Application forms for Nonresident Tuition Fellowships are available at Graduate Studies or your graduate program, and must be filed with the chairperson of your graduate program by January 15. Students receiving any funding from a government or other outside agency, whether or not the fees are paid directly to the University of California, are not eligible for a fellowship.

Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the program in which they wish to work.

The Financial Aid Office has information about loans, grants, and work-study for graduate students.

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 coursework 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 coursework, or
- a combination of specified graduate and undergraduate coursework
TEACHER CREDENTIAL PROGRAMS

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), physical and life science, 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) in the area you want to teach,
• taken the California Basic Education Skills 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, 2078 Academic Surge, 916-752-0758.

The teaching credential program starts in the fall quarter only and is nine months long. 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. It is a full-time professional program with a rigorous schedule. Student teachers are required to participate in the schools in the role of a regularly credentialled 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, 2078 Academic Surge, University of California, Davis, CA 95616-8579 or the Department of Applied Behavioral Sciences, Hart Hall, University of California, Davis, CA 95616-8523.
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 skill 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.

**PREPARATION 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.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 916-752-3009.

For additional information, see the **Official Guide to U.S. Law Schools**, published annually and prepared by the Law School Admission Council 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 may be found at college bookstores or ordered from Law Services, Box 2400, Newtown, PA 18940-0978.

**APPLYING FOR ADMISSION**

**February 1**  Deadline for filing applications for admission for 1994-95 to the School of Law

1. Request application forms and the School catalog from the Office of Admissions, School of Law, University of California, Davis, CA 95616-5201. 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 submit the Law School Application Matching Form with your application 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, October, and December. The completed test application blank, accompanied by the required fee, must be postmarked at least 30 days 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. The information booklet 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 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 a college placement center, career center, or college pre-law office. Your application cannot be considered until these 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 ethnic and 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 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. 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 UCD School of Law recognize the great need for lawyers from underrepresented groups. The School, therefore, actively solicits applications from Asian, African-American, Hispanic, American Indian, Filipino, and other underrepresented students.

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, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Scholarships for Indian and Alaskan natives are available from American Indian Graduate Center, 4520 Montgomery Blvd., N.E., Suite 1B, Albuquerque, New Mexico 87109, 505-881-4584. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is April 30.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 182 2nd Street, 2nd Floor, San Francisco, CA 94104.
PROGRAM OF STUDY

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed 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.

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. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

The courses of the professional curriculum are listed in the Programs and Courses section of this catalog.

Combined Degree Programs

Students with interests in areas such as anti-trust, business, labor law, criminal law, or environmental law, may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order 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.

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, coursework 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 the UC Berkeley School of Business for the M.B.A. degree, and with UCD 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.

SCHOOL OF LAW CALENDAR

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

Academic Calendar 1993-94

<table>
<thead>
<tr>
<th>FALL 1993</th>
<th>SPRING 1994*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program</td>
<td>Mon-Fri, Aug 16-20</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 23</td>
</tr>
<tr>
<td>Labor Day holiday</td>
<td>Mon, Sept 6</td>
</tr>
<tr>
<td>Thanksgiving holiday period</td>
<td>Thurs-Fri, Nov 25-26</td>
</tr>
<tr>
<td>Martin Luther King, Jr. holiday</td>
<td>Mon, Jan 17</td>
</tr>
<tr>
<td>President's Day holiday</td>
<td>Mon, Feb 21</td>
</tr>
<tr>
<td>Spring recess</td>
<td>Mon-Fri, Mar 28-April 1</td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 3</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Wed, Apr 30-May 4</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Thurs-Fri, May 5-20</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Wed, Dec 22</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td>Fri, May 20</td>
</tr>
</tbody>
</table>

*Friday, February 25, is treated as a Monday for class schedule purposes.
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.

**PREPARATION 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 coursework before enrollment in the program:

- **Accounting**—introductory course which discusses basic concepts.
- **Economics**—introductory courses in micro- and macroeconomics, and one upper division course in microeconomics.
- **English**—a business communication course.
- **Mathematics**—an introductory course in calculus.
- **Statistics**—one course in elementary statistics.

**APPLYING FOR ADMISSION**

**April 1**  Deadline for filing applications for admission for 1994-95 to the School of Management

Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management, University of California, Davis, CA 95616. Complete and return your application, with all supporting documents, by April 1. The application fee is $40.00. Completed applications for fellowship and graduate scholarships must be filed by January 15.

Students interested in admission to the school are urged to request an Announcement of the Graduate School of Management at an early date so that all minimum academic requirements and deadlines are met.

In addition to your application, you will need to submit:

- Transcripts from all colleges or universities previously attended.

- Scores from the Graduate Management Admission Test (GMAT). Applicants must take the GMAT no later than March. In order to be considered for fellowships and scholarships, applicants must take the October test to meet the January 15 deadline. For further information and registration forms contact: Graduate Management Admission Test, Educational Testing Service, CN 6108, Princeton, NJ 08541-6108, 609-771-7330.

- 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.

**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. Registration forms may be obtained by writing to: TOEFL, Educational Testing Service, Box 899, Princeton, NJ 08541-6108.

**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, management information systems, management science, marketing, public sector management, and science and engineering management. Students may also design their own concentration.
The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study comprised of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California, Davis, Medical Center, Sacramento; and in nearby affiliated hospitals.

**PREPARATION 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 Registration, Box 414, Iowa City, Iowa 52314. To be acceptable for the entering class of fall 1994, the new MCAT must be taken no later than fall 1993. No scores previous to 1991 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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Units</th>
<th>Semester Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. English, 1 year or its equivalent</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>2. Biological science, 1 year including laboratory, or its equivalent</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>3. General chemistry, 1 year including laboratory, or its equivalent</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>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.</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>5. Physics, 1 year or its equivalent.</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>6. Mathematics, coursework sufficient to satisfy prerequisites for integral calculus. (Coursework through integral calculus is recommended).</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

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 1994-95 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 Admissions Office, School of Medicine, University of California, Davis, CA 95616 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, School of Medicine, University of California, Davis, CA 95616, 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 15 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 it. 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 aca-
ademic achievement, academic promise, and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in the entering class will be awarded to students who are California residents. However, the School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE) and residents of participating states will be considered as residents for purposes of admission. For more information, write the WICHE 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 underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural backgrounds and which is 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 National Board Examination 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

The curriculum for the M.D. degree is normally a four-year program that provides comprehensive training for the practice of medicine. The curriculum has been designed to provide 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 UCD medical students, provide an ideal setting for hands-on clinical experience.

In addition to the Doctor of Medicine degree, the School of Medicine at the University of California, Davis offers a combined M.D./Ph.D. program whose target is to train 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 are required to apply for separate admission to both the M.D. and Ph.D. programs, and also obtain permission of the School of Medicine M.D./Ph.D. Advisory Committee. Inquiries about admission to graduate education should be directed to the Dean of Graduate Studies, University of California, Davis, CA 95616. For more information concerning the M.D./Ph.D. program, contact Ms. Suzanne Mink, Office of Curricular Support, Room 2431, MS 1A, School of Medicine, University of California, Davis, CA 95616.

SCHOOL OF MEDICINE

Academic Calendar

The School of Medicine operates on a different schedule from the rest of the campus. A more detailed academic calendar may be obtained from the Office of Curricular Support, 2427 Medical Sciences 1A, University of California, Davis 95616.

SUMMER QUARTER 1993

Instruction begins for 2nd-year students (electives) Mon, June 28
Instruction begins for 3rd- and 4th-year students Mon, June 28
Instruction begins for 2nd-year (regular curriculum) Mon, July 26
Instruction ends for 2nd-year students Fri, Sept 3
Final exams for 2nd-year students Sept 7-10
Instruction ends for 3rd- and 4th-year students Fri, Sept 17
Academic and administrative holidays

FALL QUARTER 1993

Instruction begins for 3rd- and 4th-year students Mon, Sept 20
Instruction begins for 1st- and 2nd-year students Thurs, Sept 23
Exam and study period for 1st-year students Nov 1-5
Exam and study period for 2nd-year students Oct 29-Nov 5
Instruction ends for 1st-year students Fri, Dec 3
Instruction ends for 2nd-year students Mon, Dec 6
Final exams for 1st-year students Dec 6-10
Final exams for 2nd-year students Dec 8-15
Instruction ends for 3rd- and 4th-year students Fri, Dec 10
Academic and administrative holidays

WINTER QUARTER 1994

Instruction ends for 1st-, 2nd-, 3rd-, and 4th-year students Mon, Jan 3
Exam and study period for 1st- and 2nd-year students Feb 7-11
Instruction ends for 1st-year students Fri, Mar 11
Instruction ends for 2nd-year students Fri, Mar 18
Final exams for 1st-year students Mar 14-18
Final exams for 2nd-year students Mar 21-25
Instruction ends for 3rd- and 4th-year students Fri, Mar 25
Academic and administrative holidays

SPRING QUARTER 1994

Instruction begins for 1st-, 3rd-, and 4th-year students Tues, Mar 29
Instruction begins for 2nd-year students Wed, Mar 30
Exam and study period for 1st-year students April 25-29
Instruction ends for 2nd-year students Fri, May 13
Final exams for 2nd-year students May 16-25
Instruction ends for 1st-year students Fri, June 3
Instruction ends for 4th-year students Thurs, June 6
Final exams for 1st-year students June 6-10
Instruction ends for 3rd-year students Fri, June 17
Academic and administrative holidays

Mon, Mar 28
Mon, May 30
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.

**PREPARATION 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**

- General Chemistry 15 units
- Organic Chemistry 6 units
- Physics 6 units
- Biological Sciences 10 units

**Upper Division Required Sciences**

- Embryology 4 units
- Genetics 4 units
- Biochemistry 4 units
- Physiology 4 units
- Required English 12 units
- Required Humanities and Social Sciences 12 units
- Required Statistics 4 units

(To convert semester units to quarter units, multiply by \( \frac{2}{3} \). For example, a 4-unit semester course is equivalent to a 6-unit course in the quarter system.)

You should plan your pre-veterinary 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. Many students planning to enter veterinary school have definite areas of interest within the general field of veterinary medicine. These individuals are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) that will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice, and biomedical research.

**Examinations.** All applicants must take the General Aptitude Test and the Subject Test in Biology of the Graduate Record Examination (GRE) by the October test date. GRADUATE RECORD EXAMINATION SCORES RECEIVED FROM THE NOVEMBER TEST OR LATER TESTS FOR THE YEAR THE APPLICATION IS FILED WILL NOT BE ACCEPTED FOR CONSIDERATION. 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 minimum grade-point average can qualify for admission by receiving GRE scores in the upper 30th percentile for the combined General Aptitude Test and Subject Test in Biology. 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 it includes relevant experience with types of activities that give an applicant 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, so that the applicant understands the duties and responsibilities of a practitioner and the breadth of veterinary medicine.

**APPLYING FOR ADMISSION**

**November 1** Deadline for filing applications for admission for 1994-95 to the School of Veterinary Medicine

Students are admitted to the School of Veterinary Medicine in the fall only. Applications may be obtained any time after July 1 by writing to the Office of the Associate Dean—Student Programs, School of Veterinary Medicine, University of California, Davis, CA 95616-8731 or by calling 916-752-1383. Applications, accompanied by a nonrefundable application fee of $40 must be received by this office no later than November 1.

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, contact the Director of Student Affirmative Action by writing to the Office of the Associate Dean—Student Programs or by calling 916-752-1383.

**Letters of Evaluation.** Three letters of evaluation are required in addition to your application and should be requested from persons who know you well, 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. Residents of states participating in the Western Interstate Commission for Higher Education (WICHE) will be considered as residents for purposes of admission. Based on agreements with WICHE, a small number of applicants from WICHE states may be admitted with WICHE financial support. Other applicants from WICHE states may be admitted but only as nonresidents. For information related to the WICHE program, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302. The criteria for determining residency are explained in Residency for Tuition Information in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94720. No other persons are qualified to give rulings on residency.

If you attended college out-of-state, you must include course descriptions of all required science courses with your application. You can do this by sending the current college catalog or by copying the relevant pages.

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 undergraduate work (minimum of 72 quarter units)

B. Graduate Record Examination:
   1. General Aptitude test (Verbal, Quantitative and Analytical)
   2. Subject Test in Biology

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 (MPVM) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, MPVM program. For advising purposes an option should be selected from the seven listed below at the time of application. Application deadlines for fall quarter admission are as follows: International students—March 1; Domestic students—May 1. (Please note that the deadline for applications for Non-Resident Tuition Fee Fellowships is January 15.) International applicants are encouraged to apply as early as possible. Students wishing to enter winter or spring quarter should contact the MPVM Program Director concerning application deadlines. Application forms can be requested from the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

Candidates for the MPVM degree must satisfactorily complete a total of 50 units of course work while in residence. This includes 24 units of required courses and 26 units of approved electives which include up to 10 units of research in a field appropriate to the chosen option. One requirement of the MPVM program is to 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.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who intend to complete the program in one calendar year must register in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Director and the Epidemiology and Preventive Medicine 400 instructor at the time of the student’s acceptance into the program. Students meeting this requirement may register at the beginning of the fall quarter in late September. Students who intend to remain in the program for more than one year may register in the optimal course sequencing, but arrival in August is recommended.

Four options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options and advisers are as follows:

1. Epidemiology and Herd Health: study of quantitative methods used in the design and analysis of epidemiologic, economic, herd health, and production studies
   Adviser: I. A. Gardner, D. W. Hrd

2. Veterinary Public Health: study and control of zoonotic diseases
   Adviser: B. Chorne

3. Food Safety: study of food safety and products of animal origin processing and technology
   Adviser: H. Riemann
4. Laboratory Science: design and execution of a laboratory or a laboratory/field-based project relevant to animal health
Adviser: K. M. Lam

5. Environmental Health: study of the distribution of environmental determinants and their effects on health outcomes in populations
Adviser: P. H. Kass

6. Wildlife Health: study of the quantitative methods, health and disease surveillance, interactions between wildlife, humans, and their environments, and the conservation of wildlife species
Advisers: W. M. Boyce, T. E. Carpenter

7. Veterinary Programs Administration: administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service (As the intent of this option is to permit veterinarians to spend a mid-career sabbatical leave for leadership training, enrollment is limited to individuals with demonstrated record of success in some area of veterinary medicine)
Adviser: R. H. McCapes

Inquiries regarding the program should be directed to the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

Combined Program. Students may enroll in the combined DVM/MPVM program in which the MPVM 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 DVM and MPVM degrees are completed. The advantage of the combined program resides in the ability of the student to complete the MPVM program within six months after normal completion time of the DVM 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, which may be obtained from Graduate Studies, University of California, Davis, CA 95616. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.

SCHOOL OF VETERINARY MEDICINE
Academic Calendar 1993-94

FALL QUARTER
Orientation for 1st-year students
Thur-Fri, Sept 9-10
Instruction begins for 4th-year students
Tues, Sept 7
Instruction begins for 1st-, 2nd-, and 3rd-year students

Seminar Lecture
Mon, Sept 13
Thanksgiving Holiday
To be announced
Instruction ends
Thur-Fri, Nov 25-26
Finals end
Fri, Dec 3
Fri, Dec 10

WINTER QUARTER
Instruction begins
Mon, Jan 3
M. L. King Holiday
Mon, Jan 17
President’s Holiday
Mon, Feb 21
Research Day
Mon, Feb 24
to be announced
Instruction ends
Fri, Mar 18
Finals end
Fri, Mar 25

SPRING QUARTER
Instruction begins
Mon, April 4
Memorial Day Holiday
Mon, May 30
Instruction ends
Fri, June 10
Finals and Commencement
Fri, June 17
Sat, June 11
COURSE DESIGNATIONS

Here is a sample of how a course is listed in this catalog.

190. Proseminar in Nutrition (1, 2, 3, 4). The Staff Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each seminar 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, Animal Science 49A-49B-49C) 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 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, The First Resort, and in the dormitories at the head residents' offices.

The course offerings and instructors listed in this catalog are subject to change without notice. For more current quarter offerings and instructors, refer to the Class Schedule and Room Directory, available in the UCD Bookstore.
15. Introduction to Afro-American Humanities (4) III. Stewart
Lecture—4 hours. Introduction to Afro-American cultural tradition as it evolved from West Africa to the Caribbean, South America and North America via slavery.

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.

51. History of Afro-American Dance (4) III. Wynn-Baden
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) III. Oluona
Lecture—2 hours; discussion—2 hours. Introduction to the traditional religions of the sub-Saharan African peoples: emphasis on myths, rites and symbols in West, East, Central and South African indigenous religions. Examines themes such as sacred kingship, divination system, women, sorcery, conversion and adaptation to Islam and Christianity.

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.

99. Special Study for Undergraduates (1-5), 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, III. Turner
Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the students themselves. General Education credit: Contemporary Societies.

101. Introduction to Research in the Afro-American Community (4) III.
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.

107. African Cultural Heritage in the Americas (4) III. Stewart
Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the antebellum and their repressive mechanisms in the postbellum Americas.

110. West African Social Organization (4) II, III.
Oluona
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.

120. Afro-America: Pre-Emancipation (4) II, III. The Staff
Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Ecology, social organization, and survival culture of Afro-America. Historical and comparative study of Afro-American populations in relation to other groups.

121. Afro-America: Post-Emancipation (4) II, III. The Staff
Lecture—4 hours. Prerequisite: course 10 or 120, or consent of instructor. Analysis of contemporary Afro-American cultural adaptations and social organizations within the United States.

123. The Black Female Experience in Contemporary Society (4) III. The Staff
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
Agrarian Studies
See Agricultural Systems and Environment

Agricultural and Environmental Chemistry
(A Graduate Group)

Everett Bandman, Ph.D., Chairperson of the Group

Graduate Program Office, 109 Food Science and Technology Building (916-752-1415)

Faculty Includes members from various departments in the Colleges of Agricultural and Environmental Sciences, Engineering, 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 results in the chemical and biochemical aspects of foods, fibers, polymers, pesticides, and environmental pollution. Detailed information regarding graduate study may be obtained by writing to the Graduate Group Office.


Courses in Agricultural and Environmental Chemistry (AGC)

Graduate Courses

290. Seminar (1), II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (SU 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 chemistry, pesticides, and other special topics as they apply to agricultural and environmental chemistry.

299. Research (1-12), I, II, III. The Staff (Chairperson in charge)

Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (SU grading only.)

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 3-12

English Composition Requirement 3-12

Preparatory Subject Matter 35-38

Preparatory Subject Matter 35-38

Accounting (Management 11A-11B) 1-0

Computing Science (Agricultural Science and Management 11, Computer Science Engineering 10 or 30) 3-4

Economic principles (Economics 1A-1B) 1-0

Calculus (Mathematics 16A-16B or 21A-21B) 8

Statistics (Statistics 13, 103) 8

Breadth/General Education Requirement 40

Breadth/General Education Requirement 40

(Note: Approved General Education courses may be used to simultaneously satisfy breadth for the major and the campus General Education requirement.)

Depth Subject Matter 19-21

Micro theory, Agricultural Economics 100A, 100B, 100C, 100E 8

Quantitative methods, Agricultural Economics 106, 155 8

Macro theory, Economics 101 or 130 8-5-6
Agricultural Economics

(College of Agricultural and Environmental Sciences)

Hoy F. Carman, Ph.D., Chairperson of the Department

Department Office, 116 Voorhis Hall (916-752-1517)

Student information, University House Annex:
Undergraduate, 916-752-6185
Graduate, 916-752-6886

Faculty
Julian M. Alston, Ph.D., Associate Professor
Steve Blank, Ph.D., Lecturer
Oscar R. Burt, Ph.D., Professor
Bayford D. Butler, M.S., Lecturer
Leslie J. Butler, Ph.D., Lecturer
Michael R. Caputo, Ph.D., Associate Professor
Hoy F. Carman, Ph.D., Professor
Colin A. Carter, Ph.D., Professor
James A. Chalfant, Ph.D., Associate Professor
Roberta L. Cook, Ph.D., Lecturer
Richard D. Green, Ph.D., Professor
Arthur Horvath, Ph.D., Professor
Thomas W. Hazlett, Ph.D., Associate Professor
Dale M. Heien, Ph.D., Professor
Graeme E. Heilman, Ph.D., Assistant Professor

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. Caputo, II. Summer; III. Taylor
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 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. Helfand
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. Chalfant; II. Havener; III. Holland
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 101. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

112. Fundamentals of Business Organization (4) I. Logan; II. Faber; III. Summer
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, Bay
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; promotional and advertising policies; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. (Not open for credit to students who have completed course 138.)

116A–116B. Tax Accounting (3-3) I, II. Sosnick
Lecture—2 hours; discussion—1 hour. Prerequisite: Management 11B. Determination of the federal income tax of employees, proprietors, partners, and corporations and the tax implications of alternative business decisions and methods of accounting.

120. Agricultural Policy (4) I. Summer
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. 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. General Education credit: Contemporary Societies.

130. Agricultural Markets (4) I. Carman
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.

131. Agricultural Markets, Prices and Trade (3) III. Holland
Lecture—3 hours. Prerequisite: course 100B, course 130 recommended. Analysis of economic interdependencies among industries, geographically dispersed markets, alternative product forms and markets separated in time.

132. Cooperative Business Enterprises (3) I. Sexton
Lecture—3 hours. Prerequisite: Economics 1A. Study...
136. Managerial Marketing (4) II. The Staff
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and statistics in the study of marketing; Marketing measurement and forecasting, planning, market segmenta-
tion, determination of optimal product market mix, sales and cost analysis, conduct of marketing re-
search, marketing models and systems.

139. Futures and Options Markets (3) III. Blank
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 policy as tools of asset management.

140. Farm Management (5) III. Johnston
Lecture—5 hours. Prerequisite: Economics 1A; Farm organization and resources; economic and tech-
nological principles in production decision making; analytical techniques and management control; problems in organizing and managing the farm business.

141. Consumers and the Market (4) II. Hein
Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effectiveness of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. (Students who have had or are taking course 100A; Economics 100, or the equivalent may receive only 3 units of credit, so must enroll for course 141M.) General Education credit: Contemporary Societies.

141M. Consumers and the Market (3) II. Hein
Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effectiveness of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. (Students who have had or are taking course 100A; Economics 100, or the equivalent must enroll for this 3-unit course instead of course 141.) General Education credit: Contemporary Societies.

142. Personal Finance (3) I.B. Butler; II. Shepard
Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the house-
hold. Credit, saving, insurance, and insurance by households. Principles of tax, retirement, and estate planning. (Same course as Consumer Economics 142.)

143. Investments (3) III. Shepard
Lecture—3 hours. Prerequisite: Agricultural Economics 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.

145. Farm and Rural Resources Appraisal (4) I. Johnston
Lecture—3 hours; laboratory—3 hours; field trip. Principles of rural resources appraisal; land utilization in relation to problems of development and valuation. Real estate instruments and elements of real estate finance.

147. Resource and Environmental Policy Analysis (3) I. Had
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.)

147M. Resource and Environmental Policy Analysis (2) I. Had
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.)


255. Systems Analysis and Simulation (3) III. Logan Lecture—3 hours. Dynamic model formulation and computer simulation of economic systems.

256. Applied Econometrics (4) I. Havener Lecture—3 hours; discussion—1 hour. Prerequisite: Master students in agricultural economics or econometrics, 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 256C.)

257. Analysis and Applications in Production Economics (4) III. Burt 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. Chalfet Lecture—3 hours; discussion—1 hour. 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) III. 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 on problem definition and solution using current examples drawn primarily from agriculturally oriented firms.

276. Institution and Economic Analysis of Natural Resources (3) III. Larson Lecture—2 hours; discussion—1 hour. Prerequisite: course 204/Economics 204. 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.


281. Analysis of Research in Agricultural Marketing (4) II. Sexton 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. Wan 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, externality goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.

284. Applied Demand Analysis (4) III. Heien 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 economic estimation of various demand models.

290. Introduction to Research in Agricultural Economics (1) I. Will Seminar—1 hour. Prerequisite: graduate standing in Agricultural Economics. Seminar to familiarize entering students with research issues, research applications, research methodology, information sources and problem identification. Focus is on underlying motivations, usefulness and scope of agricultural economics research. (SU grading only.)

291. Advanced Research Development (1) I. Mart Seminar—1 hour. Prerequisite: second-year Ph.D. standing. Current research problems and activities; guidance on the selection, design, funding and manageability of projects. (SU grading only.)

293. Analysis of California Agriculture and Resources (3) III. Johnston Lecture—1.5 hours; fieldwork—45 hours total of field trip, including one 3-day summer field trip. Review of 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. (SU 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. (SU grading only.)

299D. Special Study for Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

---

**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.

**Advising Center** for the major is located in 137 Hunt Hall (916-752-1715).

**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, 137 or 261 Hunt Hall (916-752-1808 or 4369). Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Teaching Credential program, you are

*Course not offered this academic year.*
encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. For graduate study refer to the Graduate Studies section in this catalog. The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the Graduate Announcement.


Courses in Agricultural Education (AHE)
Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Education Program Office, 137 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. The Staff, II. Leising
   Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and informal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs.

160. Vocational Education (3) II. Leising
   Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry.

153. 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. Audio Visual Communications (2) I. The Staff
   Lecture—1 hour; laboratory—3 hours. Theory and principles of audio-visual communications. Comparison of audio-visual materials such as transparencies, slides, computer-generated graphics, and videos. Operation and use of audio-visual equipment is stressed.

172. Multi-Media Productions (3) III. The Staff
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multi-media presentations. Instructional or professional presentations utilizing a variety of media, including slides, video, transparencies, and computer-generated graphics.

190. Seminar in Agricultural Education (2) II. The Staff
   Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit by 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) II, III. The Staff
   Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture and home economics programs in public schools. May be repeated once for credit. (P/NP grading only.)

301. Planning for Instructional Programs (3) III. Leising
   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 Education (3) III. Leising
   Lecture—1 hour; discussion—2 hours. Prerequisite: courses 100, 300 and 301. Development of teaching strategies, with special emphasis on the designing of learning experiences, instructional execution, teaching aids.

305A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I. Leising
   Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Vocational Agriculture (5-18) I. The Staff
   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.

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) II. Leising
   Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

390. Seminar: Issues in Agricultural and Home Economics Education (2) II. The Staff
   Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program; courses 305A, 306A or 307. Discussion and evaluation of current issues, theories and research in home economics and agricultural education. (S/U grading only.)

Agricultural Engineering Technology

See Applied Biological Systems Technology (under Biological and Agricultural Engineering)

Agricultural Practices

See Applied Biological Systems Technology (under Biological and Agricultural Engineering)

Agricultural Systems and Environment

College of Agricultural and Environmental Sciences
Faculty. See under Department of Agronomy and Range Science.

The Major Program
This major is designed for students who are interested in one or more of the environmental systems that make up the agricultural and natural environment. Courses are selected to provide an interdisciplinary background that encompasses both natural science and social science disciplines. Students will acquire an understanding of the agricultural production systems as managed ecosystems, how they function, how they interact with the environment and how they are intimately connected with human society and social change. In addition, students will 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, a program offered for the first time in the 1981-82 academic year, focuses on the production and resource management of crops, such as agronomy, environmental horticulture, pomology, vegetable crops or viticulture. Specialization in Agricultural and Environmental Management encompasses agricultural and environmental resource management, environmental economics, pest management, animal and range management. The Agricultural and Environmental Education specialization provides preparation in educational foundations, planning and teaching, with development of an understanding of agriculture and environment specialization. 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 will gain practical experience through a combination of internships and practica. In addition, students may pursue an Honors thesis in their senior year.

Career Alternatives. Graduates from this program will be prepared for a wide range of careers, including technical and management positions in agricultural and environmental systems, as well as in the public and private sectors. Additional career opportunities may be found in the fields of agriculture, environmental science, policy development, and related areas.

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.

Course not offered this academic year.
Areas of Specialization (choose one):

Sustainable Production Systems..........................42-56
Includes food and agricultural production, agroecology, crop improvement, and pest management. Restricted electives allow students to choose between a broad education in sustainable agriculture or to focus on one or two areas of agriculture (e.g., agronomy, crop improvement, environmental horticulture, pest management, vegetable crops, viticulture).

Ecology of cropping systems (Plant Science 101 and Agricultural Systems and Environment 101)...........3

Agriculture and the Environment (Agricultural Systems and the Environment 101)..........................3

Animals and People (Animal Science 1 or 2)..............4

Preparatory Subject Matter.................................40-43

Biological sciences (Biological Sciences 1A, 1B)...........10

General chemistry (Chemistry 2A-2B).......................10

Physics (Physics 1A-1B or Physics 5A-5B, see specialization)..........................6-8

Mathematics (Mathematics 12A, 12B, or Mathematics 12A)..............3

Computer skills (Agricultural Systems and the Environment 21)......................3

Statistics (Agricultural Systems and the Environment 123 or 125)......................3

Economics (Economics 1A).................................5

Breadth/General Education.................................16-24

To include one class from each of the following two groups of courses:

Social, Cultural & Ethnic Studies: Anthropology 2, 101, 129, 133; Asian American Studies 1, 2, 100; Chicano Studies 130, 132; Native American Studies 10, 70; Sociology 1, 3, 110, 129, 132, 144; Women's Studies 50.

History, Policy, & Philosophy of Science:

History 135A or B, 136, 189A, B; History and Philosophy of Science 130A, B, 150; Political Science 3, 123, 124.

Recommended: to meet the Civilization and Culture general education requirement, minor in History and Philosophy of Science or a foreign language: courses in anthropology, cultural geography and nutrition (Anthropology 1, Geography 2, 50, Nutrition 10), geography and physical geography (Geology 1, 20, 50, Geography 1), and climate and weather (Atmospheric Science 105; Geography 1, 3) to complement one's area of specialization.

Depth Subject Matter.................................20-21

Crop biology and ecology (Agricultural Systems and the Environment 150 or Plant Science 101 or 145)......................4

Agricultural economics (Agricultural Economics 113 or 140)..............................4

Ecological principles (Botany 117 or Environmental Studies 100)..............................4

Agricultural practicum (Agricultural Systems and the Environment 92, 99; Agricultural Economics 49A, 49B, 49C; Animal Science 49A, B, C; Agricultural Biological Technology 49, 50, 149)......................3

Internship (Agricultural Systems and the Environment 139)..............................3

Seminar (Agricultural Systems and the Environment 190)..............................2

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 advisor approval the Senior Thesis can satisfy up to 12 units of restricted electives in the major.

*Course not offered this academic year.

Areas of Specialization (choose one):

Sustainable Production Systems..........................42-56
Includes food and agricultural production, agroecology, crop improvement, and pest management. Restricted electives allow students to choose between a broad education in sustainable agriculture or to focus on one or two areas of agriculture (e.g., agronomy, crop improvement, environmental horticulture, pest management, vegetable crops, viticulture).

Ecology of cropping systems (Plant Science 101 and Agricultural Systems and Environment 101)..........................3

Agriculture and the Environment (Agricultural Systems and the Environment 101)..........................3

Animals and People (Animal Science 1 or 2)..............4

Preparatory Subject Matter.................................40-43

Biological sciences (Biological Sciences 1A, 1B)...........10

General chemistry (Chemistry 2A-2B).......................10

Physics (Physics 1A-1B or Physics 5A-5B, see specialization)..........................6-8

Mathematics (Mathematics 12A, 12B, or Mathematics 12A)..............3

Computer skills (Agricultural Systems and the Environment 21)......................3

Statistics (Agricultural Systems and the Environment 123 or 125)......................3

Economics (Economics 1A).................................5

Breadth/General Education.................................16-24

To include one class from each of the following two groups of courses:

Social, Cultural & Ethnic Studies: Anthropology 2, 101, 129, 133; Asian American Studies 1, 2, 100; Chicano Studies 130, 132; Native American Studies 10, 70; Sociology 1, 3, 110, 129, 132, 144; Women's Studies 50.

History, Policy, & Philosophy of Science:

History 135A or B, 136, 189A, B; History and Philosophy of Science 130A, B, 150; Political Science 3, 123, 124.

Recommended: to meet the Civilization and Culture general education requirement, minor in History and Philosophy of Science or a foreign language: courses in anthropology, cultural geography and nutrition (Anthropology 1, Geography 2, 50, Nutrition 10), geography and physical geography (Geology 1, 20, 50, Geography 1), and climate and weather (Atmospheric Science 105; Geography 1, 3) to complement one's area of specialization.

Depth Subject Matter.................................20-21

Crop biology and ecology (Agricultural Systems and the Environment 150 or Plant Science 101 or 145)......................4

Agricultural economics (Agricultural Economics 113 or 140)..............................4

Ecological principles (Botany 117 or Environmental Studies 100)..............................4

Agricultural practicum (Agricultural Systems and the Environment 92, 99; Agricultural Economics 49A, 49B, 49C; Animal Science 49A, B, C; Agricultural Biological Technology 49, 50, 149)......................3

Internship (Agricultural Systems and the Environment 139)..............................3

Seminar (Agricultural Systems and the Environment 190)..............................2

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 advisor approval the Senior Thesis can satisfy up to 12 units of restricted electives in the major.

*Course not offered this academic year.
Soil science (Soil Science 10 or 100) ........................................ 3-4
Management of information (Agricultural Education 101) .......... 3-4
Technical writing (English 104) ........................................... 1-3
Upper division internship (Agricultural Education 192) .......... 3-12
Information media (Agricultural Education 171, 172; Rhetoric and Communication 140, 142A, 142B) .................. 12-13
Communication and information transfer (Applied Behavioral Sciences 170; Rhetoric and Communication 130, 136) .......... 4
Agricultural and environmental communications and information emphasis ........................................ 10-15
Courses to be selected in consultation with academic advisor. Students typically will select one area of agriculture to develop a strong basis for selecting three to four courses.

Unrestricted Electives ...................................................... 10-33
Recommended courses listed under Plant, Animal, and Environmental Sciences.

Total Units for the Major .................................................. 180

Major Adviser: Carol Shannon
Advising Center located at 137 Hunt Hall (916-752-1715).

Agricultural Computing and Information Systems Minor

Minor Program Requirements:

UNITs

Agricultural Computing and Information Systems .......................................................... 18-19
Agricultural Computing and Information Systems—core courses: Agricultural Science and Management 121, 150, Animal Science 128 ......................................................... 11
Minimum of 7 units from two of the three following groups:
(b) Communication and business organization: Agricultural Economics 112, Applied Behavioral Sciences 168, Rhetoric and Communication 103, 136 ......................................................... 3-4
(c) Instrumentation and control: Food Science and Technology 156, Agricultural Engineering 166 ......................................................... 3-4

Minor Adviser: R.E. Plant
Advising Center located in 133 Hunt Hall (916-752-1715).
Graduate Study. Refer to the Graduate Studies section in this catalog.

Courses in Agricultural Systems and Environment (ASE)

Lower Division Courses

1. Agriculture Nature and Society (3) I. Romanii Lecture—3 hours. 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. Not open for credit to students who have completed Agrarian Studies 2. General Education credit with concurrent enrollment in course 1G: Nature and Environment.

10. Agriculture Nature and Society: Discussion (1) I. Romanii Discussion—1 hour. Prerequisite: concurrent enrollment in course 1. Discussion of additional readings and topics. Saturday field trip to visit California agriculture. General Education credit with concurrent enrollment in course 1: Nature and Environment.

2. Botany and Physiology of Cultivated Plants (4) II. Arora, Shennan Lecture—3 hours; discussion/lab—3 hours. Prerequisite: high school course in biology and chemistry required. An introduction to the underlying botanical and physiological principles of cultivated plants and the environment. Concepts include plant selection, cultivation, and utilization. Laboratories include discussions and interactive demonstrations.

21. Applications of Microcomputers in Agriculture (3) II, III. Plant Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: high school algebra. Concepts of computing in an agricultural context: applications of microcomputers and BASIC spreadsheets, data-base management, word processing and communication. Not open for credit to students who have completed Agricultural Science and Management 21.

22. Introduction to Agricultural Ecosystems (4) III. Shennan and Van Horn Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, Chemistry 2B (may be taken concurrently), and course 2 or the equivalent. Role of the biological and physical components of agricultural ecosystems and the structure, function and management of whole agro-ecosystems. Comparative analysis of important agricultural systems and practices. On- and off-campus field trips.

92. Internship (1-12) 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. (PnP grading only.)

198H. Senior Honors Thesis (2-6) II, III. The Staff Independent study. Prerequisite: Agricultural Systems and Environment major; senior standing; overall GPA of 3.50 or higher and consent of advisor. 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. (PnP grading only; deferred grading only, pending completion of thesis.)

198H. Directed Group Study (1-5) II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (PnP grading only.)

198. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (PnP grading only.)

Upper Division Courses

101. Management of Information for the Agricultural and Environmental Sciences (4) III. Zibert Lecture—3 hours; laboratory—3 hours. Prerequisite: Agricultural Science and Management 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.

120. Applied Statistics in Agricultural Science (4) I. Geng Lecture—3 hours; discussion/lab—2 hours. Prerequisite: upper division standing. Applications of statistical methods to the analysis and interpretation of research data in farm, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical techniques. Specialized laboratory sections cover procedures, data processing and interpretations. Not open for credit to students who have completed Agricultural Science and Management 150.

121. Analysis and Simulation of Agricultural Systems (4) I. Plant Lecture—3 hours; discussion/lab—1 hour. Prerequisite: course 21 or the equivalent experience with computers, and Mathematics 16B or the equivalent. Process of systems analysis, dynamic simulation of crops and biological populations, construction and use of simulation models for agricultural and ecological systems at the population and individual organismal levels. Not open for credit to students who have completed Agricultural Science and Management 121.

150. Cropping Systems of the World (4) II. Shennan Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 or Biological Sciences 1C, and course 22 or

\[\text{Course not offered this academic year.}\]

Plant Science 101. World food production systems: concepts and assessment of sustainability; evaluation of methodological approaches to study and improve farming systems; socioeconomic and gender considerations. Examination of case studies from selected annual and perennial cropping systems. One-week session for simulation games.

190. Seminar on Alternatives in Agriculture (2) II. Van Horn 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. (PnP grading only.)

192. Internship (1-12) 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. (PnP grading only.)

194H. Senior Honors Thesis (2-6) II, III. The Staff Independent study. Prerequisite: Agricultural Systems and Environment major; senior standing; overall GPA of 3.50 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. (PnP grading only; deferred grading only, pending completion of thesis.)

198. Directed Group Study (1-5) II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (PnP grading only.)

198. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (PnP grading only.)

Agronomy (College of Agricultural and Environmental Sciences) Faculty. See under Department of Agronomy and Range Science Major Program. See the major in Plant Science or Range and Wildlands Science or Agricultural Systems and Environment.

Graduate Study. A program of study is offered leading to the M.S. degree in Agronomy. Information can be obtained in the Advising Office at 137 Hunt Hall. Also see the Graduate Studies section in this catalog.

Graduate Adviser: L. Jackson
Related Courses. See Plant Science and Range Science Courses in Agronomy (AGR) Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

Lower Division Courses

92. Agronomy Internship (1-12) 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. (PnP grading only.)

Upper Division Courses

100. Principles of Agronomy (3) III. Travis Lecture—3 hours. Prerequisite: a course in general botany or Plant Science 2 or consent of instructor. Fundamentals of field crop production and agronomic problem solving using biological, physiological, and genetic principles. Economic, political and social problems are considered in relationship to technological problems if either impair or provide the means to promote agricultural development.
112 Agronomy and Range Science

100L. Principles of Agronomy Laboratory (1) III. Travis
Laboratory—3 hours. Prerequisite: course 100 (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production. Offered in alternate years.

*110. Perspectives in Biotechnology (3) II. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Genetics 10. Current issues in biotechnology will be related to their impact on the biological sciences and society. Examples of genetic manipulation through transformation and transfer in agriculture and medicine will be stressed. Offered in alternate years.

111. Cereal Crops of the World (4) III. Quasel
Lecture—4 hours; laboratory—3 hours. Prerequisite: courses 100, 100L. Contributions of cereal crops to human development. Adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rye, and sorghum. Emphasis is on recent developments and scientific improvements. Half-day field trip will be required. Offered in alternate years.

*112. Forage Crop Ecology (3) III. The Staff
Lecture—4 hours; laboratory—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.

113. Fiber, Oil, and Sugar Crops in a Changing World (4) I. Rains
Lecture—4 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Industrial crops as world resources of food, feed, fiber, and consumer goods. The relationship of crops to their physical environment. Technological changes; social and political forces that shape crop production, and utilization practices. Offered in alternate years.

*120. Morphology and Reproduction of Agro-

197. Tutoring in Agronomy (1-5) I, II, III. The Staff
Tutoring—1 to 5 hours. Prerequisite: enrollment in courses 100 to 106. Tutor in charge.

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

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

205A. Design, Analysis and Interpretation (4) II. Geng
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Science and Management 150. Planning and analysis of field and laboratory experiments with emphasis on concept and technique of designing experiments. Randomized block, factorial, incomplete block, split-plot designs discussed together with appropriate methods of data analysis and interpretation.

205B. Design, Analysis and Interpretation (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Science and Management 150 or the equivalent; Agricultural Science and Management 21 recommended. Planning and analysis of field and laboratory experiments with emphasis on use of multiple regression, multivariate analysis, and dynamic simulation techniques in the biological interpretation of results.

207. Plant Population Biology (3) III. Jain
Lecture—4 hours; laboratory—discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104), an advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate student 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; Biochemistry 101A-108 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 205A; Genetics 106; Plant Science 113. Philosophy, methods, and problems in developing improved plant species. Topics include: introgression, 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.

222. Quantitative Genetics and Plant Im-

223. Selection Theory in Plant Breeding (3) II. Quasel
Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructor. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding schemes. Offered in alternate years.

224. Chromosome Evolution (3) I. Dvorak
Lecture—3 hours; laboratory—discussion—1 hour. Prerequisite: Genetics 201 and 222 or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in alternate years.

226. Advanced Topics in the Physiology of Crop and Range Plants (3) I. Hufskov
Lecture—3 hours. Prerequisite: Botany 111 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

233. Biological Nitrogen Fixation (3) II. Phillips
Lecture—2 hours; seminar—1 hour. Relationships between fundamental and applied nitrogen-fixation research in biochemistry, genetics, physiology, microbiology, and ecology with overall emphasis on increasing agronomic productivity. Offered in alternate years.

234. Physiology of Crop Growth and Develop-

290. Seminar in Crop Growth, Production and Util-

297. Tutoring in Agronomy (1-5) I, II, III. The Staff
Tutoring—1 to 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. (SU 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)
(SU grading only)

Professional Course

401. Functioning as a Professional Beyond UCD (2) I. Phillips
Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: graduate standing as M.S. or Ph.D. candidate. Students will develop a letter of application, a curriculum vitae, a statement of teaching and/or research interest, and a job interview seminar for a position advertised in their area of professional specialization. Group discussions will provide constructive suggestions for strengthening individual presentations. Offered in alternate years. (SU grading only.)

Agronomy and Range Science

(College of Agricultural and Environmental Sciences)
Calvin O. Quasel, Ph.D., Chairperson of the Department
Department Office, 133 Hunt Hall (916-752-1703)

Faculty
R. William Breidenbach, Ph.D., Lecturer
Ivan W. Buddinghagen, Ph.D., Professor
Montague W. Demient, Ph.D., Associate Professor
Jan Drobak, Ph.D., Professor
Shu Geng, Ph.D., Professor
Melvin R. George, Ph.D., Lecturer
Paul L. Gepf, Ph.D., Associate Professor
James E. Hill, Ph.D., Lecturer
Ray C. Hufskov, Professor
Leeland F. Jackson, Ph.D., Lecturer
Subodh K. Jain, Ph.D., Professor
Judy A. Jernstedt, Ph.D., Associate Professor
Thomas A. Kerby, Ph.D., Lecturer
James G. Leising, Ph.D., Lecturer, Supervisor of Graduate Education
John W. Menke, Ph.D., Professor
Donald A. Philips, Ph.D., Professor
Richard E. Plant, Ph.D., Professor
Y. P. Puri, Ph.D., Lecturer
Calvin O. Quasel, Ph.D., Professor
William Rains, Ph.D., Professor

*Course not offered this academic year.
American Studies

College of Letters and Science

David Scott Wilson, Ph.D., Program Director
Program Office, 816 Sproul Hall (916-752-3377)

Committee in Charge
Lyn Loehr, Ph.D. (English), Chairperson
Susan Kaier, Ph.D. (Textiles and Clothing)
Jay Meehl, Ph.D. (American Studies)
Michael Smith, Ph.D. (History)
Patricia Turner, Ph.D. (African-American Studies, American Studies)

David Van Loan, Ph.D. (English)
Clarence E. Walker, Ph.D. (History)
David Scott Wilson, Ph.D. (American Studies)

Faculty
Ruth Frankenberg, Ph.D., Assistant Professor
Jay Meehl, Ph.D., Professor
Patricia Turner, Ph.D., Assistant Professor
David Scott Wilson, Ph.D., Senior Lecturer

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 the United States has evolved, and reflect the influence of various cultural and social forces. The courses are designed to provide an understanding of the American experience. Students are encouraged to take courses in a variety of subject areas and approaches. This flexibility has meant that our graduates have been able to move into a wide range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

A.B. Major Requirements:

Preparatory Subject Matter .................................................................................................................. 24
One course from American Studies 1 series. .................................................................................. 4
One course from American Studies 10, Asian American Studies 1, Chinaco Studies 10 or 20, Native American Studies 10, or Women’s Studies 50. ........................................................................... 4
Two courses chosen from History 17A, 17B, 17C, 72A, 72B. ........................................................... 8
One course chosen from English 30A, 30B. .................................................................................... 4
One course chosen from Anthropology 2, Sociology 2. ................................................................... 4

Depth Subject Matter ......................................................................................................................... 46
American Studies core courses ......................................................................................................... 12
American Studies 110, 120, and 130
American Cultural Themes ............................................................................................................... 8
Choose any two courses from the 150 series. .................................................................................. 12
Three Junior Preliminaries ................................................................................................................ 6

Emphasis ........................................................................................................................................... 20
In consultation with an American Studies advisor, the student designs a program of 20 units of coursework, which may be used in the following major areas:

Minor Program Requirements:

American Studies ............................................................................................................................... 20
American Studies upper division courses. ......................................................................................... 20

Total Units for the Major: ................................................................................................................... 70

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

Courses in American Studies (AMS)

Lower Division Courses
1A. Technology, Science, and American Culture (4) I. Meehling
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. General Education credit: Civilization and Culture.

1B. Religion in American Lives (4) II. Wilson
Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. The study of religion in American lives, with a focus on the role of gender, race, ethnicity, social class, and sexual orientation in the individual’s life course. General Education credit: Civilization and Culture.

1C. American Lives through Autobiography (4) II. Meehling
Lecture—2 hours; discussion—2 hours; fieldwork—1 hour. The study of autobiography as a tool for understanding the individual’s life story told by Americans, with an emphasis on the role of gender, race, ethnicity, social class, and sexual orientation in the individual’s life course. General Education credit: Civilization and Culture.

1E. Nature and Culture in America (4) III. Wilson
Lecture—3 hours; fieldwork—3 hours. The study of American natural history, with a focus on the relationship between nature and human culture. General Education credit: Civilization and Culture.

*Course not offered this academic year.

1F. The Popular Image of Women in America (4) II. The Staff
Lecture—2 hours; discussion—1 hour; directed analysis of popular media, public opinion, and social history. Special topics: Emphasis on the role of gender and the relationship between the popular media and the construction of the American image. General Education credit: Civilization and Culture.

2. Forms of American Wisdom (2) III. Meehling
Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America, from the Enlightenment to the present day. Special topics: Emphasis on the role of gender and the relationship between the popular media and the construction of the American image. General Education credit: Civilization and Culture.

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. Typically for lower division students. General Education credit: Civilization and Culture.

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge, PN3 grading only.

Upper Division Courses
101A-H. Special Topics (1-3) I, II, III. The Staff
Prerequisite: consent of instructor. Typically for upper division students. General Education credit: Civilization and Culture.
Anatomy

See Veterinary Anatomy and Cell Biology: Cell Biology and Human Anatomy (Medicine, School of)

Anesthesiology

See Medicine, School of

Animal Behavior (A Graduate Group)

Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group

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.)

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. (May not be repeated toward graduation with the same instructor or for the same topic.)

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) III. 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 (3) 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.

290. Seminar in Animal Behavior (1-3) I, II, III. The Staff. Seminar—1 to 3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff. Prerequisite: and consent of instructor. (S/U grading only.)

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science.

Major Program. See the major in Genetics.

Related Courses. See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; Vegetable Crops 220.

Anatomy

See Veterinary Anatomy and Cell Biology: Cell Biology and Human Anatomy (Medicine, School of)

Animal Behavior (A Graduate Group)

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.)

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. (May not be repeated toward graduation with the same instructor or for the same topic.)

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) III. 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 (3) 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.

290. Seminar in Animal Behavior (1-3) I, II, III. The Staff. Seminar—1 to 3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)

299. Research (1-12) I, II, III. The Staff. Prerequisite: and consent of instructor. (S/U grading only.)

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science.

Major Program. See the major in Genetics.

Related Courses. See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; 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, 1252 Meyer Hall.

Upper Division Courses

107. Genetics and animal breeding (5) III. 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, and index 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. Concepts of expected value, estimation of variance components, and the simulation of biological data.

111. Molecular Biology Laboratory Techniques (4) II. Murray, 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 basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology.

116. 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. Galt
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 differentials 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; courses 204 recommended. Procedures for the genetic evaluation of individuals to include selective 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 208 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 (3) 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. (SU grading only.)

Animal Physiology
See Biological Sciences: Section of Neurobiology, Physiology and Behavior

Animal Science
(College of Agricultural and Environmental Sciences)
Edward O. Price, Ph.D., Chairperson of the Department
Department Office, 2223 Meyer Hall (916-752-1250)
Bodega Marine Laboratory (BML)
Bodega Bay, CA (707-875-2211)

Faculty
Thomas E. Adams, Ph.D., Associate Professor
Gary B. Angreen, Ph.D., Academic Senate Distinguished Teaching Award
R. Leland Baldwin, Jr., Ph.D., Professor
Patricia A. Berger, Ph.D., Associate Professor
Dan L. Brown, Ph.D., Associate Professor
Chris Calvert, Ph.D., Associate Professor
Ernest S. Chang, Ph.D., Professor (Biological Sciences, Bodega Marine Laboratory)
Walls H. Clark, Jr., Ph.D., Professor (Biological Sciences, Bodega Marine Laboratory)
Douglas E. Conklin, Ph.D., Associate Professor
Fred S. Conte, Ph.D., Lecturer
Edward J. DePeters, Ph.D., Associate Professor
Serge Durocher, Ph.D., Associate Professor
James G. Fazekas, Ph.D., Assistant Professor
Thomas R. Furlow, Ph.D., Associate Professor
Graham A. E. Furse, Ph.D., Professor
Ian Garrett, Ph.D., Senior Lecturer
Dennis Hedgecock, Ph.D., Lecturer (Bodega Marine Laboratory)
Siaw S. O. Hung, Ph.D., Associate Professor
Yu-Bang Liao, Ph.D., Professor
Joan M. Macy, Ph.D., Professor
Juan F. Medrano, Ph.D., Associate Professor
Gary P. Moborg, Ph.D., Professor
James D. Murray, Ph.D., Associate Professor
Antonina M. Oberbauer, Ph.D., Assistant Professor
James W. O'Leary, Ph.D., Lecturer
Edward O. Price, Ph.D., Professor
Janet F. Ross, Ph.D., Associate Professor
Roberto D. Sainz, Ph.D., Assistant Professor
Richard A. Zinn, Ph.D., Associate Professor

Emeritus Faculty
C. Robert Ashmore, Ph.D., Professor Emeritus
G. Eric Bradford, Ph.D., Professor Emeritus
Floyd D. Carroll, Ph.D., Professor Emeritus
Perry T. Currey, Ph.D., Professor Emeritus
William N. Garrett, Ph.D., Professor Emeritus
Hubert Heimann, Ph.D., Professor Emeritus
Pat Charles, Ph.D., Professor Emeritus
E. M. Fleischer, Ph.D., Professor Emeritus
James H. Meyer, Ph.D., Professor Emeritus
Chancellor Emeritus
Wade C. Rinder, Ph.D., Professor Emeritus
Robert W. Touchberry, Ph.D., Professor Emeritus
William C. Wein, Ph.D., Professor Emeritus

Animal Science 115
The Major Program
The animal science major is designed to give students an understanding of the proper care of animals and their utilization by people for food, fiber, work, research, companionship, and recreation. Aquaculture, companion animals, laboratory species, and domestic animal agriculture are included in animal science. The study of animals is achieved through biological, physical, and social science courses, such as chemistry, biochemistry, genetics, physiology, nutrition, ecology, and their integration in the various animal science courses.

The Program: Two options are available in the major: Animal Biology and Aquaculture. The Animal Biology option is designed for students with interests in the biology of domestic animals, covering the range of study from the molecular and cellular levels to the whole animal and population levels of animals. Course requirements emphasize gross anatomy and physiology, nutrition, food science, and clinical applications. The Aquaculture option is appropriate for students interested in applying principles of animal production to aquatic species.

Internships and Career Alternatives: Career opportunities for graduates cover a wide range of options from federal and state agencies to industry and institutions, and professions involved with domestic animals and aquaculture. These include positions in management, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research.

Preparation for veterinary medicine or other professional schools or graduate study can be achieved by careful planning in the major.

B.S. Major Requirements:

Written/Oral Expression

Preparatory Subject Matter

Animal science (Animal Science 1, 2, and either 15 or 18 or 41 and 41L or 42) 11-12

Biological sciences (Biological Sciences 1A, 1B, 1C) 15

Chemistry (Chemistry 2A, 2B, 8A, 8B) 16

Computer sciences (Agricultural Systems and Environment 21) 3

Mathematics (Mathematics 16A-16B or more advanced mathematics courses) 6

Statistics (Agricultural Systems and Environment 120 or Statistics 102, or other courses in quantitative skills with prior approval of the master adviser) 4

Breadth/General Education

Depth Subject Matter

Biological science (Biology 101, 102, 103, 104) 13

Genetics, Biological Sciences 101, Animal Genetics 107 5

Nutrition, Nutrition 110 5

Areas of Specialization

Animal Biology option

Physiology, Physiology 110 5

Laboratory, one course from the following: Animal Genetics 111, Animal Science 135, Microbiology 177L (Microbiology 177 must be taken concurrently), Biochemistry 101L, Veterinary Microbiology and Immunology 126L 2-6

At least one course from the Animal Care and Management series: Animal Science 115, 140, 143, 144, 146, and the balance from Animal Science 102, 104, 105, 106, 118, 119, 120, 120L, 123, 124, 128, 131, 135 (if not elected above), 141, 145, 147, 148, Animal Genetics 108, 109, 111 (if not elected above), Microbiology 177L, 177L (if not elected above), Nutrition 115, 122, 129L, 123, 124, Physiology 121, 121L, 130.

*Course not offered this academic year.
1. Domestic Animals and People (4) I. Farmula Lecture—hours; laboratory—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. General Education credit: Nature and Environment.

2. Introductory Animal Science (4) III. Berger Lecture—hours; laboratory—hours. Prerequisite: course 1 and Biological Sciences 1A recommended. Introduction to animal science and the agriculture industry. General Education credit: Nature and Environment.

15. Introductory Horse Husbandry (3) II. Roser Lecture—hours. Prerequisite: course 2 recommended. Introduction to care and use of light horses emphasizing principles of care selection of horses, responsibilities of ownership, recreational use and raising of foals.


21. Livestock and Dairy Cattle Judging (2) III. Van Liew Laboratory—hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to livestock, meat and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production.

22A-22B. Animal Behavior (2) II. Van Liew Laboratory—hours; weekend field trips. Prerequisite: course 21 or the equivalent. Study of individual and group classes of animals with emphasis on visual appraisal of conformation and its accurate description. Course is required for intercollegiate judging competition. (PANP grading only.)


41L. Domestic Animal Production Laboratory (2) I. DePeters Laboratory—hours. Prerequisite: course 41 may be taken concurrently. Animal production principles and practices, including feeding strategies and dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (PANP grading only.)


49A-49B. Animal Management Practices (2-2) II-III. The Staff Discussion—hours, laboratory—hours. The application of the principles of elementary biology, the art and science of management of beef and dairy cattle, dairy goats, hogs, sheep, swine, and laboratory animals. (PANP grading only.)

92. Internship in Animal Science (1-2) I, II, III. The Staff (Department Chairperson in charge). Internship—hours. Prerequisite: consent of instructor. Off-campus in animal science, agriculture, veterinary medicine, and agriculture-related fields. The student will work under the direction of an employer. All requirements of Internship Approval Request form must be met. (PANP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (PANP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (PANP grading only.)

Upper Division Courses

102. Limited Resource Animal Agriculture (4) III. Brown Lecture—hours; laboratory—hours; one all-day Saturday field trip required. Prerequisite: course 2. Environmentally and economically sound methods are presented to meet objectives of limited resource animal agriculture on family farms, small farms, Third World systems and suburb enterprises are considered. (Same course as International Agricultural Development 102.)

104. Principles of Domestic Animal Behavior (3) I. Price Lecture—hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domesticated species. Emphasis is placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. (Students who have received credit for Zoology 105 may receive credit for this course.)

105. Behavioral Adaptation of Domestic Animals (2) II. Price Lecture—hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management.

106. Domestic Animal Behavior Laboratory (2) II. Price Laboratory—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.

115. Advanced Horse Production (4) I. Roser Lecture—hours; laboratory—hours. Prerequisite: course 15; Biological Sciences 101; Nutrition 110 or 115; Physiology 110, or consent of instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of horses. Recommended for students who wish to become professionally involved in the horse industry.

118. Fish Production (4) I. Beer, Dorrath Lecture—hours; discussion—hours. Prerequisite: Wildlife and Fisheries Biology 120 and 121. Current practices in fish production; relationships 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) I. Conklin, Conte Lecture—hours; discussion—hours. Prerequisite: Zoology 112 or 142, or the equivalent. Applied biological systems and techniques in aquaculture used in aquaculture systems. Prerequisite: course as Food Science and Technology 120.)

120. Principles of Meat Science (3) III. Bandman (Food Science and Technology) Lecture—hours. Prerequisite: Biological Sciences 103, or the equivalent. Anatomical, physiological, developmental, and biochemical aspects of muscle underpinning 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.)

120L. Meat Science Laboratory (2) III, Lee, Bandman (Food Science and Technology) Lecture—hours. Prerequisite: Biological Sciences 103, or the equivalent. Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, sensory evaluation of meat, and field trips to processing plants. (Same course as Food Science and Technology 120.)


124. Lactation (4) II. Baldwin Lecture—hours; laboratory—hours. Prerequisite: Physiology 110; Nutrition 110, or the equivalent. Background knowledge 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.
128. Linear Programming in Animal Agriculture (3) I. Fadel
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division nutrition 110, 115, or equivalent; understanding of animal production, or consent of instructor. Linear programming in animal agriculture emphasizing farm planning and ration formulation. Problem-solving experience in understanding, developing, and applying linear programs.

131. Reproduction and Early Development in Aquatic Animals (4) II. Dorotheou
Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 10. Ecology and development of fish and amphibians.}

135. Experimental Biochemistry Laboratory (4) I. Califert
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 common laboratory-analytical methods, cost analysis, literature review and publication writing and proofread. (Not open to students who have received credit for Biochemistry 100.)

140. Management of Laboratory Animals (4) I. Adams
Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Physiology 110. 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) I. Roser/Garrett
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.

143. Pig and Poultry Care and Management (4) I. Garnett, Ernst, Berger
Lecture—3 hours; laboratory—3 hours. Prerequisite: Nutrition 110 or 115; Physiology 110. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips.

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 microcomputer programming 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) I. 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. Deters
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 124, Animal Genetics 107, and Nutrition 115, or consent of instructor. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal breeding considering the environment and animal well-being.

147. Dairy Processing and Marketing (3) II. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisites: course 148 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) I. Garnett
Lecture/discussion—4 hours. Prerequisites: course 141 or 146 or 147 or consent of instructor. Examination of the areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise.

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 (1-2) I, II, III. The Staff (Chairperson in charge)
Internships are arranged with completion of 84 units and consent of instructor. Internship of 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.)

194A-194HB-194HC. Undergraduate Honors Thesis in Animal Science (4-4-4) I-III. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—9 hours. Prerequisites: Physiology 110, Biological Sciences 102, 103 and Nutrition 110; minimum cumulative GPA of 3.2 and satisfactory recommendation from Honors Selection Committee. Students will carry out a research project chosen from faculty-suggested or approved proposals during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Animal Science (1-2) 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) II. 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 168A, Statistics 108. Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear and linear models, including computer programs. Models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Offered in alternate years.

215. Advanced Concepts of Growth Regulation (3) III. Gobets
Lecture—3 hours. Prerequisite: Biological Sciences 103, Genetics 102B, Zoology 121A-121B. Cellular and molecular mechanisms of growth regulation. Topics include cellular proliferation and differentiation in both tissue culture and animal models. Autocrine, paracrine, and transacting factors are discussed. Emphasis on critical reading and writing, including development of an oral research proposal.

216. Grant Writing Techniques (3) I. Oberhauser
Lecture—1 hour. Prerequisite: course 215. Introduction to the peer-reviewed grant writing process. Sources of funding, proposal description, budget calculations, and the review mechanism will be discussed. Proposals written in course 215 will be reviewed. (SU grading only.)

255. 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 in animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of literature. May be repeated for credit when topics differ. (SU grading only.)

290. Seminar (1, 2, 3-4, 4-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Reports and discussions of topics of current interest. Literature, experience, and data are scheduled as appropriate. (SU 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. (SU 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. Evaluation later sent to the Graduate Advisor with a copy to the student. (SU grading only.)

298. Group Study (1-2) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Sect. 1, 2, 3—letter grading; from Sect. 4—ON-SU grading only.)

299. Research (1-2) I, II, III. The Staff (Chairperson in charge)
(SU 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 biological and social sciences of domestic animal species with a strong background in managerial economics. Graduates of this program manage farms and participate in a wide variety of other businesses related to agriculture. Many graduates enter graduate, veterinary and medical schools, while others become teachers and extension personnel.

The Program. The interdisciplinary program in animal science and management is designed for students who wish to develop an understanding of the animal sciences and the biological and social sciences. The program is structured to provide a strong foundation in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), as well as courses in economics and humanities. After completion of preparatory courses, students focus on both the animal sciences and the economic sciences (business administration, marketing, finance, business organization, and systems analysis).
Advising Center for the major (including peer advising) is located in 1202 Meyer Hall (916-752-6118).

Anthropology (College of Letters and Science)
Aram A. Yengyavan, Ph.D., Chairperson of the Department
Department Office, 330 Young Hall
(916-752-0746/0746)

Faculty
John M. Beaton, Ph.D., Assistant Professor
Robert L. Bettinger, Ph.D., Professor
Monique Bergerhoff-Mulder, Ph.D., Assistant Professor
David J. Boyd, Ph.D., Associate Professor
Richard T. Curley, Ph.D., Lecturer
William G. Davis, Ph.D., Professor
Jack D. Forbes, Ph.D., Professor (Anthropology, Native American Studies)
Charles R. Hale, Ph.D., Assistant Professor
Sarah B. Hrdy, Ph.D., Professor
Suad Joseph, Ph.D., Associate Professor
Smadar Lavie, Ph.D., Assistant Professor (Anthropology, Critical Theory)
Martha J. Macri, Ph.D., Assistant Professor (Anthropology, Native American Studies)
Henry M. McKenney, Ph.D., Professor
Peter S. Rodman, Ph.D., Professor
William G. 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., Associate Professor
Carolyn F. Wall, Ph.D., Senior Lecturer
John T. Walton, Ph.D., Professor (Anthropology, Sociology)

Emeriti Faculty
Daniel J. Cowley, Ph.D., Professor Emeritus
David L. Omsley, 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 Davis are subdivided into four categories—biological, social/cultural, linguistic, and archaeological. The student of anthropology learns about human social life—past and present—and gains a broad understanding of humans and societies.

The Program: Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to Homin sapiens should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected cultural areas or languages (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeological (prehistoric and the techniques and methods of archaeology) should consult an advisor before choosing a 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 preprofessional preparation. A degree in anthropology with appropriate courses in education provides the good preparation for high school teaching in social sciences or natural sciences.

A.B. Major Requirements:

Preparatory Subject Matter ............... 24-39
Anthropology 1, 2, 3, 4 ................. 16
Statistics 13 ........................................ 4
Geography 1 or Environmental Studies 30 .... 4
Foreign language (15 units or the equivalent in one language) ......................... 0-15

Depth Subject Matter ................. 40
Anthropology 110, 126, 137, 170 .... 16
Linguistic anthropology, one course .... 4
Biological anthropology, one course ... 4
Ethnography, one course ............... 4
Archaeology, one additional course ... 4
An additional 8 units selected from the following: any upper division anthropology course, Art History 150, 151, Genetics 100 .................. 8

Total Units for the Major ............ 64-79

B.S. Major Requirements:

Preparatory Subject Matter ............... 45-56
Anthropology 1, 2, 3, 5 ................. 16
Biological Sciences 1A, 1B ............. 10
Chemistry 2A, 2B ................. 10
Statistics 13, 32, or 102 ............... 10
Chemistry 8A-8B or Mathematics 16A-16B ... 6
Foreign language (10 units or the equivalent in one language) ......................... 0-10

Depth Subject Matter ................. 45
Six courses in anthropology, including courses 152, 153 and 154A, and the remaining 3 chosen in consultation with major advisor ............... 22-25
Biological Sciences 101 and either Genetics 103 or Zoology 148 .................. 7
Additional units from the list below to achieve a minimum of 45 upper division units. Include at least one laboratory course in human or vertebrate anatomy.

Total units for the Major ............ 90-101

Recommended
Geology 1, 2, 3, Physics 5A, 5B, 5C, Psychology 1, 15

Bachelor of Science List of Courses
Biological anthropology, Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158


Major Advisers: A.B. degree: R. Curley, B.S. degree: H.M. McHenry

Minor Program Requirements:

Preparatory Subject Matter ............... 19-24
Anthropology 114, 117, 127 ............... 4

One course from Anthropology 114, 117, 127 ............... 4
One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158 ............... 4
One course from Anthropology 160, 171, 173, 174, 175 ............... 4
One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 149, 150 ............... 4
One course from Anthropology 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 135, 136, 137, 138 ............... 4

Course not offered this academic year.
One additional course from remaining upper division Anthropology courses...........4

Biological emphasis .................................................................18-21
Anthropology 152, 153, 154A ......................13
Two additional upper division Anthropology courses chosen in consultation with B.S. degree undergraduate adviser...........5-8

Social-Cultural emphasis ..................................................18-21
Anthropology 137 .................................................................4
One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 149, 176 ..............4
Two courses from Anthropology 101, 114, 117, 118, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 133, 135 .............8

One additional upper division Anthropology course chosen in consultation with A.B. degree undergraduate adviser...........2-5

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, P.S. Rodman.

Courses in Anthropology (ANT)

Lower Division Courses

1. Human Evolutionary Biology (4) I. McHenry, II. P.S. Rodman, III. D.G. Smith

2. Cultural Anthropology (4) I. Davis, II. Curley, III. Hale

3. Introduction to Archaeology (4) I. The Staff; III. Beaton

4. Introduction to Anthropological Linguistics (4) I. The Staff; II. L. Smith

5. Proseminar in Biological Anthropology (4) III. Rodman

6. Comparative Cultures (4) III. Curley

7. Social-Cultural Anthropology (4) III. Folklore (4)

8. Anthropological Linguistics (4) I. Macri

9. Elementary Linguistic Analysis (4) I. Macri

10. Linguistic Prehistory (4) I. Macri

11. Linguistic Prehistory, Historical Linguistics, and Reconstruction (4) I. Macri

12. Indigenous Languages of North America (4) III. Macri

13. World Writing Systems (4) I. Macri

14. Language and Culture (4) II. Wall

15. Behavioral and Evolutionary Biology of the Human Life Cycle (5) I. The Staff; II. Rodman, III. The Staff

16. Economic Anthropology (4) III. Davis

*Course not offered this academic year.
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, apartheid, the world system, and international feminism on women and development.

*132. Festivals and Carnivals (4) I. III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic and folkloric analysis of selected festivals, religious, regional, class, vocational, and other affiliations.

133. Cultural Ecology (4) II. Orové Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and their environments. Prerequisite: given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. General Education credit: Contemporary Societies.

134. Race and Sex: Race Mixture and Mixed Populations (4) II. Forbes Lecture—3 hours; discussion—1 hour. Phenomena of race mixing, miscegenation, interracial marriage, and mixed (hybrid) human populations. Emphasis on social and cultural effects of race mixture and of the interaction of racism and sexual behavior.

135. Peasant Society and Culture (4) I. 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.

136. Visual Anthropology (4) II. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 128 or 137. Overview of film use in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential feature of this course is student production emphasized. Film production as an aspect of anthropological research and problems encountered in producing films in the field.

137. Theory in Social-Cultural Anthropology (4) I. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative overview of major theoretical orientations in social-cultural anthropology, including evolutionary, historical, functional, ecological, psychodynamic, and Marxist approaches. Selected controversies are examined to clarify strengths and limitations of extant theories.

*138. Ethnographic Research Methods in Anthropology (4) II. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 137. Basic concepts 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.

*139. Race, Class, Gender Systems (4) I. 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 race and gender and biological differences interact with property and marital systems to affect the distribution of power in society.

*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. Consideration will be given to the continuities and discontinuities between periods prior to European contact and the present.

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.

*141A. History 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.

141B. Ethnography of California and the Great Basin (4) III. Betts 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 relations at the time of European contact. (Former course 141C.)

142. Peoples of the Middle East (4) III. Lave 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 136B.)

*143. Ethnology of Southeast Asia (4) I. 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.

*144. Contemporary Societies and Cultures of Latin America (4) II. Orové Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to change in politics and society.

145. Colonialism and Ethnicity in the Caribbean (4) II. Halle Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. A discussion of the history of the Caribbean and the influences of colonialism and post-colonialism on current societies. (Former course 145B.)

146. Indigenous Peoples of Mexico and Central America (4) II. C.A. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An examination of the history of the native peoples of Mexico and Central America: their histories, socio-political organization, mythologies, languages, material culture, writing systems.

147. Peoples of the Pacific (4) II. 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 nationalism.

148A. Traditional Chinese Society (4) II. Skinner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An analysis of pre-colonial and political economy of late traditional China to 1949. Attention given to nature of social change in this pre-modern agrarian civilization.

148B. Family, Gender, and Population in Contemporary China (4) III. 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.

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 twenty-first-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.

149B. Contemporary Japanese Society (4) II. J. S. Smith Lecture—3 hours; discussion—1 hour. Introduction to contemporary Japanese social structure, socioeconomic organization, and patterns of culture. Analysis of rural-urban cultural discontinuity, industrialization, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. Offered in alternate years.

(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 primates, monkeys, and apes.

152. Human Evolution and Fossil Man (4) III. McHenry Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Nature andresults of the evolutionary processes involved in the formation and differentiation of mankind. General Education credit: Nature and Environment.

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. General Education credit: Nature and Environment.

154. The Evolution of Primate Behavior (5) I. Rodman Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Examines ecological diversity and evolution of social systems of primates, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory.

*154B. Ecology and Sociology of Primates (4) III. Rodman 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 studying, describing, and analyzing the ecology and sociology of primates. Laboratory consists of direct observation of captive primates and local birds with quantitative analysis and interpretation of observations.

155. Comparative Primate Anatomy (4) II. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1A, B. The functional anatomy of primates, monkeys, apes, and man. Emphasizes the anatomical evidence for human evolution.

156. Human Osteology (4) III. McHenry Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1A, B. The functional anatomy of human cranial and postcranial bones, and the study of human skeletal remains, including growth and development, pathology, evolution, dentition, and variations in race, sex, and age.

157. Anthropological Genetics (3) II. D.G. Smith Lecture—3 hours. Prerequisites: course 1 or Biological Sciences 1A, and Genetics 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, serous proteins, and red cell enzymes (hemoglobinization), general electrolytes on starch, cellulose acetate and polyacryl-
lamide, immunodiffusion and immunoelectrophoresis on agarase. (PINP grading only.)

158. The Evolution of Females and Males: Biological Perspective (4) I. Hyloc Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationships between biological processes and cultural construction of gender roles.

170. Archaeological and Prehistory (4) I. Betinger Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Introduction to history and development of prehistoric and post-paleolithic, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World.

171. Archaeology and the Environment (4) I. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Examine theoretical, methodological, and practical considerations in reconstruction of environmental history and their impact on studying human ecology through archaeology. Environmental and human population dynamics and their interactions are considered particularly for non-complex societies. Offered in alternate years.

172. New World Prehistory: The First arrivals (4) II. 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.

173. New World Prehistory: Archaic Adaptations (4) III. Betinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. A course which covers the archaeological and environmental history of the Americas from pre-agricultural times to the early historic period.

174. New World Prehistory: Formative Life-ways in North and South America (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. An introduction to the prehistoric and environmental history of the Americas from pre-agricultural times to the early historic period.

175. New World Prehistory: The High Cultures Mesoamerican and Andean South America (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. An introduction to the prehistoric and environmental history of the Americas from pre-agricultural times to the early historic period.

176. Prehistory of California and the Great Basin (4) A. Lecture—4 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.

178. Hunter-Gatherers (4) I. Betinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern adaptations of human societies which support themselves with primitive technologies and without the benefits of domesticated plants and animals. Offered in alternate years. General Education credit: Contemporary Societies.

179. Ethnoarchaeology (4) II. Beaton Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography as an archeologist examines residence patterning, site-formation processes, hunting and gathering behavior and other artifact creating activities and how they contribute to modern archeological thinking.

181. Field Course in Archaeological Method (5) Summer. The Staff Lecture—8 hours; daily field investigation. Prerequisite: course 3. On-site course in archæological meth-

odis and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archaeological survey, mapping, and excavation.

183. Laboratory in Archeological Analysis (4) III. Betinger Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, experimental research, and analysis of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment.

184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) I. Lecture—4 hours; discussion—4 hours. Prerequisite: courses 2 or 3. Examination of the role of lithic, ceramic, 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 cultural change are discussed.

191. Topics in Anthropology (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 181 or consent of instructor. Study of special topics in anthropology. May be repeated for credit.

192. Internship in Anthropology (1-12) II, III, The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 181 or consent of instructor. Internship in anthropological work in the field, in city, or in federal and state agencies.

194. Special Study for Honors Students (1-5) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: open only to majors of senior standing. May be repeated for credit.

197. Tutoring in Anthropology (1-5) I, II, III. The Staff Lecture—1 hour. Prerequisite: open only to majors of senior standing. May be repeated for credit.

198. Directed Group Study (1-5) I, II, III. The Staff Lecture—1 hour. Prerequisite: open only to majors of senior standing. May be repeated for credit.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour. Prerequisite: open only to majors of senior standing. May be repeated for credit.

Graduate Courses

201. History of Anthropological Theory (4) I. Yen-guyen Lecture—2 hours; discussion—1 hour. Prerequisite: course 181 or consent of instructor. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students taking intensive preparation in biological anthropology.

202. History and Theory of Biological Anthropology (4) III. McHenry Lecture—2 hours; discussion—1 hour. Prerequisite: course 181 or consent of instructor. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students taking intensive preparation in biological anthropology.

203. History and Theory of Archaeology (3) I. Betinger Lecture—3 hours. Prerequisite: course 181 or consent of instructor. Advanced consideration of fundamental issues in the history of anthropology. Emphasis on critical examination of major contemporary issues in anthropology.

205. History and Theory in Anthropological Linguistics (4) I. J. S. Smith Lecture—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 methodologies.


207. Ethnographic Writing (4) II. Lavey Lecture—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

209. Field Course in Linguistics (4) III. MacLeish Lecture—4 hours; discussions—1 hour. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

210. Aspects of Culture Structure (4) I. Vitalian; III. Boyd Lecture—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

211. Advanced Topics in Cultural Ecology (3) I. Orlove Lecture—4 hours; discussion—1 hour. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

212. Problems in Archeological Method (4) II. Beaton Lecture—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

217. Andean Prehistory: Theory and Method (4) III. Seminar—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

218. Topics in North American Prehistory (4) II. Seminar—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

220. Field Course in Linguistics (4) III. MacLeish Lecture—4 hours; discussion—1 hour. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.

221. Rural Transformation in Postcolonial Societies (4) III. Orlove Lecture—3 hours; term paper. Prerequisite: course 181 or consent of instructor. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodologies.
222. Problems in Urban Anthropology (4)  I. Walton Seminar—3 hours; term 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)  I. 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 World with special reference to state ideology (nationalism) and forms of control. Offered in alternate years.

226. Consciousness and Resistance (4) III. Hale Seminar—3 hours; term paper. Prerequisite: completion of 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 frontality. Offered in alternate years.

227. Behavioral Ecology and Anthropology (4) III. Borgoff-Multi 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.

230. Comparative Family Demography (4) II. Seminar Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing in one of the social sciences (including History). Comparative examination of population processes—marriage/unperson, fertility, contraception, and migration—in social-cultural and historical context, with an emphasis on contrasting family systems. Case studies are drawn from Western Europe (France, Italy) and East Asia (China, Japan, Thailand). Offered in alternate years.

232. Political Movements (4) I. Walton Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. Interdisciplinary approach to political movements of protest and reform, and emphasis on historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, national choice, moral economy, social class and gender.

238. 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. Forbes 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: reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasian-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 relating to the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

252. Human Evolution Seminar (4) III. 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 will focus on one or more of the following: molecular evolution, primate evolution, hominid evolution. Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit.

253. Seminar in Human Biology (4) III. 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) I. Rodman 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 different topics covered.

258. Evolution and Human Behavior (4) II. Hryd Seminar—3 hours; term paper. Prerequisite: courses 151, 154A or 154B, 158 or consent of instructor. Focus will be on demographic and ecological issues. May be repeated for credit when topics vary.

265. Conceptual Problems in Applied Anthropology (4) II. The Staff Seminar—3 hours; term paper. Prerequisite: consent of instructor, Advanced study in cultural history. Specialized studies in directed culture change, problems of planning and evaluation, use 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 fields of anthropology. To be presented by guest speakers. May be repeated twice for credit (S/U grading only).

292. Seminar in Linguistic Anthropology (4) I. J. S. Smith Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topics differ.

288. Group Study (1-4) I, II, III. The Staff (Chairperson in charge) (S/U grading only)

295. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only)

299. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only)

---

**Applied Behavioral Sciences**

(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 Office, 106 AOB 4

Community Studies and Development and Human Development (916-752-0770)

**Community Studies and Development**

**Faculty**

Stephen B. Brush, Ph.D., Professor

Isao Fujimoto, M.A., Senior Lecturer

Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education

James Griepoth, Ph.D., Lecturer/CE Specialist

Martin F. Kenny, Ph.D., Professor

Dean MacCannell, Ph.D., Professor

Michael P. Smith, Ph.D., Professor

Miriam J. Wells, Ph.D., Professor

**Emeriti Faculty**

Marc Piislik, Ph.D., Professor Emeritus

Orville E. Thompson, Ph.D., Professor Emeritus

**Human Development and Family Studies**

**Faculty**

Curtis R. Acre, Ph.D., Adjunct Associate Professor

Carolyn Allden, Ph.D., Assistant Professor

Keith Barton, Ph.D., Professor

Brenda K. Bryant, Ph.D., Professor

James Chisholm, Ph.D., Associate Professor

Lawrence V. Harper, Ph.D., Professor

Rossman Kraft, Ph.D., Associate Professor

Beth Ober, Ph.D., Assistant Professor

Emmy W. Werner, Ph.D., Professor

**Emeriti Faculty**

Louise M. Bachrach, Ed.D., Professor Emerita

Glenn R. Hawkes, Ph.D., Professor Emeritus

David B. Lynn, Ph.D., Professor Emeritus

**The Major Program**

The applied behavioral sciences major 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 Applied Behavioral Sciences 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, community health development, community design and planning, community development and the Asian American, socio-environmental planning, and community education.

**Internships and Career Alternatives**

Applied Behavioral Science students are required to have an internship in their field before graduation. Internships have been arranged with such agencies as local, county, and state planning units, health departments, schools, housing offices, and community education programs. Applied behavioral sciences 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:**

---

**Universal Language Requirement:**

**Basic Skills:**

4-12

See College requirement: 0-6
Courses in Applied Behavioral Sciences (ABS)

Lower Division Courses

1. The Community (4) I. Fujimoto
   Lecture—4 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including urban, suburban mainline, and California farm workers.

2. Ethnicity and American Communities (4) II. 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, the impact and issues related to urban and American ethnic groups. General Education credit: Contemporary Societies.

17. Population and Community (2) I. Fujimoto
   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.

18. Science, Technology and Society (4) III. Kennedy
   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.

47. Orientation to Community Resources (2) II. Thompson; III. Fujimoto
   Field trip—4 days; seminar—three 2-hour sessions. (Course given between quarters). Prerequisite: consent of instructor. Intensive field course in San Francisco. 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 (1-2) I, II, III. The Staff (Chairperson in charge)
   Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off or on campus, in community and institutional settings. (P/NP grading only.)

99. Directed Group Study for Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge)
   (P/NP grading only.)

Upper Division Courses

118. Technology and Society (4) I. Kennedy
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technology on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment.

110. Political Economy of Regional Development (4) III. Kennedy
   Lecture—4 hours. Prerequisite: one undergraduate economics, agricultural economics or political 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.

*Course not offered this academic year.
164. Theories in Organizational Change (4) II. The Staff Lecture—4 hours. Prerequisite: courses 1 or 2. Development of approaches to planned change including normative re-educative, applied systems, and developmental strategies.


170. Communication of Innovations (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Information and innovation diffusing from organizational and social settings. Exploration of the role of information networks and communication channels in planned social change efforts. Philosophical consideration of the consequences of innovation diffusion.

171. Housing and Social Policy (4) III. Wells Lecture—4 hours. Social impact, economics, and political influences on 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 in social inequality or equivalent. Analysis of the phenomenon of inequality in the U.S. Various approaches to inequality will be 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) III. The Staff Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Design and implementation 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 community. 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 the individual, community and national development. Planning process and role of education in social and community change. Offered in alternate years.

176. Comparative Ethnicity (4) II. The Staff 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.

178. Social Networks and Community Health (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Sociology 2. Relevance of social ties to the health of the individual, family and community. Multidisciplinary look at forces affecting family and friendship ties, as well as community services; and at how social bonds affect physical and psychological health. General education credit: Contemporary Societies.

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 64 units and consent of instructor. Supervised internship, of and on campus, in community and institutional settings. (P/NP grading only.)


196. Senior Project in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: major in Applied Behavioral Sciences and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P/NP grading only.)

197C Community Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Supervised tutoring in the community. (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. Planning Processes in Applied Behavioral Sciences (4) I. The Staff Lecture—4 hours. Prerequisite: planning practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions, agencies and the community at large.

202. Systems Approach for Organizational Change (4) II. The Staff Lecture—4 hours. Prerequisite: course 201 or consent of instructor. Organizational structure and processes from systems perspective, organization-environment interplay, dynamics of resource allocation, impact of power and environment on structure, communication networks, role of innovation and determinants of change. Emphasis upon applications of theory for organizational learning.

203. Evaluation and Decision Making (4) II. Goldman Lecture—4 hours. Prerequisite: graduate standing; knowledge of social science research methodology. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of related methods of research, organizational planning, decision-making and evaluation research, value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

240. Community Theory (4) I. The Staff Lecture—4 hours. Prerequisite: two or more upper division courses in sociology, anthropology, philosophy or critical theory. Classic and current theories of community with an emphasis on the comparative community research tradition from Redfield's Yucatan studies to Macro-social Accounting. Readings include Roethschild, Marx, Levi-Strauss, the Cornelia School, Functionalism accounts of community and critical theory.

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. The Staff Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

243. Professional Skills for Human Service and Community Development (4) I. The Staff Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in a social science discipline. Theory of interpersonal communication and small group process as applied to development of professional skills as community developer, program administrator and or consultant.

244. The Political Economy of Domestic Development (4) II. 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 prediction of urban forces; role of the state in uneven development; dynamics of urban growth and decline; regional development in California.

290. Seminar (1-5) I, II, III. The Staff Seminar—1 hour. Analysis of research in applied behavioral sciences. (SU grading only.)

297. Practicum in Community Development (2) I, II. The Staff Seminar—2 hours. Prerequisite: course 243 and field placement in community human service agency. Application of theories and approaches of community development through field placement in a community or human service agency. Further development of skills as change agents in community setting. Consideration of research design as it relates to relevant research. May be repeated for a maximum of 4 units. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Applied Mathematics

(A Graduate Program)

John K. Hunter, Ph.D., Chairperson of the Group

Faculty: Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Biological Sciences, Chemistry, Computer Science Engineering, Chemical, Civil, Electrical, and Mechanical Engineering, Environmental Studies, Epidemiology and Preventive Medicine, Land, Air and Water Resources, Management, Mathematics, Objectives

*Course not offered this academic year.
and Gynecology, Physics, Radiology, Statistics, Wildlife and Fisheries Biology, and Zoology.

Graduate Study. Students prepare for careers relating to the application of mathematics to problems in the physical and life sciences, engineering, and management. The degree requirements consist of two years of rigorous training in applied mathematics followed by 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. 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 applicants 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); T. Nathan (Land, Air, and Water Resources).

## Applied Physics

**See Physics**

## Aquaculture

**See Animal Science; Applied Biological Systems Technology (under Biological and Agricultural Engineering); and Wildlife and Fisheries Biology**

### Art History

(From the College of Letters and Science)

Mary H. Fong, Ph.D., Director, Program in Art History

Department Office: 111A Art Building

(916) 522-0105

**Faculty**

Mary H. Fong, Ph.D., Professor

Robert J. Grigg, Ph.D., Associate Professor

Diane Sachs-Peabody, Ph.D., Associate Professor

Jefrey Ruda, Ph.D., Associate Professor

**Emeritus Faculty**

Daniel J. Crowley, 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 arts and visual 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/-icon, Renaissance, baroque, modern, Non-Literate, Oriental, 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 either in graduate school, or in professional programs. It can also serve as the foundation for careers in the teaching, research, museum, and art administration, art criticism, publishing, and art investment.

### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History 1A, 1B, 1C, 1D, 2A</td>
<td>20</td>
</tr>
<tr>
<td>One art studio course in drawing, printmaking, painting, or photography</td>
<td>4</td>
</tr>
<tr>
<td>One art studio course in sculpture or ceramics</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nine upper division art history courses, which must be taken in at least six of the following seven areas</td>
<td>36</td>
</tr>
<tr>
<td>(a) Ancient</td>
<td></td>
</tr>
<tr>
<td>(b) Medieval/Northern Renaissance</td>
<td></td>
</tr>
<tr>
<td>(c) Southern Renaissance/Baroque</td>
<td></td>
</tr>
<tr>
<td>(d) Modern Painting, Sculpture</td>
<td></td>
</tr>
<tr>
<td>(e) Modern Architecture</td>
<td></td>
</tr>
<tr>
<td>(f) China/Japan</td>
<td></td>
</tr>
<tr>
<td>(g) Non-Literate</td>
<td></td>
</tr>
</tbody>
</table>

**Total Units for the Major** = 64

### Minor Program Requirements:

<table>
<thead>
<tr>
<th>Art History</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five upper division art history courses (one lower division substitute course permissible)</td>
<td>20</td>
</tr>
<tr>
<td>Courses must be chosen from at least three of the following subjects areas with no more than two courses in any single area</td>
<td></td>
</tr>
<tr>
<td>(a) Ancient</td>
<td></td>
</tr>
<tr>
<td>(b) Medieval/Northern Renaissance</td>
<td></td>
</tr>
<tr>
<td>(c) Southern Renaissance/Baroque</td>
<td></td>
</tr>
<tr>
<td>(d) Modern Painting, Sculpture</td>
<td></td>
</tr>
<tr>
<td>(e) Modern Architecture</td>
<td></td>
</tr>
<tr>
<td>(f) China/Japan</td>
<td></td>
</tr>
<tr>
<td>(g) Non-Literate</td>
<td></td>
</tr>
</tbody>
</table>

**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 290 or 291) and an honors thesis (course 294). Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Letter and Graduation 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.

*Course not offered this academic year.

### Courses in Art History (AHU)

#### Lower Division Courses

**1A. Ancient Art (4).** (4) Lecture—3 hours; discussion—1 hour. Art of the ancient Mediterranean world from the prehistoric caves to the fall of the Roman Empire. General Education credit with concurrent enrollment in course 1A: Civilization and Culture.

**1AG. Writing: On Ancient Art (1).** Lecture—3 hours; discussion—1 hour. Christian, Baroque, Modern, and Classical traditions in European Art from the fourth through the sixteenth centuries. General Education credit with concurrent enrollment in course 1A: Civilization and Culture.

**1BG. Writing: On Medieval-Renaissance Art (1).** Lecture—3 hours; discussion—1 hour. Christian, Baroque, Modern, and Classical traditions in European Art from the fourth through the sixteenth centuries. General Education credit with concurrent enrollment in course 1B: Civilization and Culture.

**1CG. Writing: On Baroque-Modern Art (1).** Lecture—3 hours; discussion—1 hour. Christian, Baroque, Modern, and Classical traditions in European Art from the fourth through the sixteenth centuries. General Education credit with concurrent enrollment in course 1C: Civilization and Culture.

**1DG. Writing: On Ancient Art (1).** Lecture—3 hours; discussion—1 hour. General Education credit with concurrent enrollment in course 1D: Civilization and Culture.

#### 1D. Asian Art (4). I, Fong

Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental art, religions, and architecture. General Education credit with concurrent enrollment in course 1D: Civilization and Culture.

**1FH. Introduction to Art: Art and Civilization (4).** Lecture—3 hours; discussion—1 hour. General Education credit with concurrent enrollment in course 1F: Civilization and Culture.

**1FH. Introduction to Art: Art and Civilization (4).** Lecture—3 hours; discussion—1 hour. General Education credit with concurrent enrollment in course 1F: Civilization and Culture.

**1A. Ancient Art (4).** Lecture—3 hours; discussion—1 hour. General Education credit with concurrent enrollment in course 1A: Civilization and Culture.

**25. Introduction to Architectural History (4).** (4) Lecture—3 hours; discussion—1 hour. Formal and social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. General Education credit with concurrent enrollment in course 25: Civilization and Culture.

**25. Introduction to Architectural History (4).** (4) Lecture—3 hours; discussion—1 hour. General Education credit with concurrent enrollment in course 25: Civilization and Culture.
Art History

98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. Restricted to lower division students. (P/N 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) I. 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.

151. Arts of the Indians of the Americas (4) II. 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 contemporary Indian arts and crafts from Alaska to Chile.

152. Arts of Oceania and Prehistoric Europe (4) I. 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.

154A. Early Greek Art and Architecture (4) II. The Staff
Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of the history and significance of major monuments in Greek art and architecture from the late Bronze Age to the death of Pericles.

154B. Later Greek Art and Architecture (4) III. The Staff
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of major monuments in Greek art and architecture from the age of Aristotle to the death of Alexander the Great and the Hellenistic Age and the death of Cleopatra.

155. Roman Art (4) II. The Staff
Lecture—3 hours; term paper or gallery studies and review. The art of the Roman Republic and Imperial Rome.

156. History of Printmaking (4) II. Ruda
Lecture—3 hours; term paper or gallery studies and review. The development of graphic media in the Western World from the fifteenth century to the present.

157A. Chinese Art (4) II. Fong
Lecture—3 hours; term paper or gallery studies and review. Survey from the beginning to the twelfth century focusing on the major art forms that are traditionally known as well as newly discovered through the archaeology in China.

157B. Chinese Painting (4) III. Fong
Lecture—3 hours; term paper or gallery studies and review. The development 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-painters.

157C. Printmaking in the People's Republic of China (4) III. Fong
Lecture—3 hours; term paper. Prerequisite: course 157 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.

164. The Arts of Japan (4) III. Fong
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 to nineteenth century.

165. 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.

176A. Art of the Middle Ages: Early Christian and Byzantine Art (4) I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian and Byzantine Empires through the later Roman Empire in the West and to the final capture of Constantinople in the East.

176B. Art of the Middle Ages: Early Medieval and Romanesque Art (4) II. Grigg
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.

176C. Art of the Middle Ages: Gothic (4) II. Grigg
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. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Austria, Germany, France and the Lowlands, including such artists as Albrecht Dürer, Alaric Erasmus.

177B. Northern European Art (4) III. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in France, Germany and the Lowlands, including such artists as Albrecht Dürer, Alaric Erasmus.

178A. Italian Renaissance Art (4) III. Ruda
Lecture—3 hours; term paper or gallery studies and review. Giottino in the origins of the Renaissance. Painting and sculpture in Italy from Pisanello through Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century.

178B. Italian Renaissance Art (4) III. Ruda
Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence, fifteenth century artists from Donatello and Masaccio through Bellini, in their artistic and cultural setting.

178C. Italian Renaissance Art (4) III. Ruda

179A. Baroque Art (4) I. The Staff
Lecture—3 hours; term paper or gallery studies and review. Western European architecture, sculpture and the art of the garden from the late sixteenth through the early eighteenth century.

179B. Baroque Art (4) II. Ruda
Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velasquez. Offered in alternate years.

182. British Art (1750-1814) (4) II. McLeod
Lecture—3 hours; discussion—1 hour. Prerequisite: course 181. Topics in the place of art in British culture—1750 to 1914. Topics include influence of class and gender, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and later-known advocates of modern British, social realism, and colonial themes.

183A. Art in the Age of Revolution (4) I. McLeod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. An 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.

183B. Impressionism and Post-Impressionism (4) II. McLeod
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.

183C. Modern Art: 1900-1945 (4) I. Macleod
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 include Picasso, Matisse, Kandinsky, Malevich, and Pollock.

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) I. 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.

183F. The Tradition of Modernism (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 183A, 183B, 183C, or 183D. Introduction to the artistic movements which traditionally constitute twentieth-century Modernism. Study will be divided into sections dealing with the formation of such avant-garde movements as Cubism and Surrealism, and sessions critically examining the emergence of individual artists as representatives of such movements.

184. Twentieth Century Architecture (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. Major movements in architecture in the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged.

186. After Modernism: 1968 (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory, focusing on the decade following events of 1968. Examines emergent critique of culture in relation to the legacy of Frankfurt School and structuralists such as pop art, conceptual art, performance actions, and Fluxus movement.

187. Word and Image in German Modernism (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory dealing with links between visual and verbal production within the alternative traditions of modernism. Images and key texts of Expressionism, Blue Rider, Dada, Bauhaus, N.S. Fischbeck, Weimar Film, and Post War Reaktion examined.

188B. Architecture of the United States (4) II. The Staff
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.

193C. Painting of the United States (4) II. McLeod
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.

193D. 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.

193E. Internship (2-12) I, II. 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. (PINP 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 advisor. 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.  

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)  
(PINP grading only.)  

Graduate Courses  

200. Introduction to Art Historical Research (4) I. The Staff  
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) III. The 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 topics differ 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) II. Fong  
Seminar—3 hours; term paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor.  

265. Seminar: The Orient in Western Art (4) II. Fong  
Seminar—3 hours; term paper. Selected topics in European and American art which demonstrate an assimilation of oriental 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.  

277. Seminar in Northern Renaissance Art (4) I. Grigg  
Seminar—3 hours; term paper. Selected areas of special study in Netherlandish and German art of the fifteenth and sixteenth centuries. May be repeated for credit with consent of instructor.  

278. Seminar in Italian Renaissance Art (4) I, 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.  

286. After Modernism: The Eighties (4) III. The Staff  
Seminar—3 hours; term paper. Prerequisite: course 186; course 189A, 189B, 189C, or 184 recommended. Selected areas of special study of post-structuralist critical theories converging on visual production and analysis; aspects of signification and discourse, feminist critiques and gender theories, semiotics and deconstruction; works of art relating to sexual identities and images, and reappropriation of painting.  

288. Seminar in European and American Architecture (4) III. 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)  
(SU 4 units 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. (SU grading only.)  

Professional Courses  

401. Museum Training: Curatorial Principles (4) II. Amerson  

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 unique 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)  
Conrad Akenson, R.A.S. (honors), Chairperson of the Department  
Department Office, 111A Art Building  
(316) 752-3105  

Faculty  
L. Price Amerson, J., Ph.D., Lecturer  
(Director, Nelson Gallery)  
Conrad Akenson, R.A.S. (honors), Professor  
Squeek Cavnarth, M.F.A., Professor  
William Henderson, M.F.A., Professor  
Harvey Hemiltfarb, M.A., Professor, Academic Senate  
Distinguished Teaching Award  
David Hollowell, M.F.A., Associate Professor  
Lucy A. Pul, M.F.A., Associate Professor  
Irini Rodotis, Ph.D., Assistant Professor  
Cornelia Schut, M.F.A., Professor, Academic Senate  
Distinguished Teaching Award  
Bao Chi Zh, M.F.A., Assistant Professor  

Emeriti Faculty  
Richard D. Cramer, M.F.A., Professor Emeritus  
Roy DeForest, M.F.A., Professor Emeritus  
Rolland C. Petersen, M.A., Professor Emeritus  
Professor Emeritus, UC Davis Prize for Teaching and Scholarly Achievement  

Emeriti Faculty  
Richard D. Cramer, M.F.A., Professor Emeritus  
Roy DeForest, M.F.A., Professor Emeritus  
Rolland C. Petersen, M.A., Professor Emeritus  
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 fine 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 (painting, sculpture, printmaking, ceramics, photography, film making, as well as theory and criticism) in upper division work.  

Portfolio  
Students at Davis should keep a continuing portfolio of their art work which is subject to faculty review at such times as is decided by the major. The major, trying to add the first day of class (the department gives preference to students who have preregistered), requests 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 studio art major, establishing a basis for further specialization in commercial art.  

A.B. Major Requirements:  

Preparatory Subject Matter:  
Three courses from Art Studio 2, 3, 4, 5, 16; see prerequisites required for upper division courses.  
Two courses from Art History 1A, 1B, 1C, 1D  
Depth Subject Matter:  
Six courses, under three different instructors, chosen from Group A, B, or C.  
One course from Group B, Theory and Criticism  
Two upper division courses in art history  

Total units for the Major:  

56  

Recommended  
(a) Students interested in drawing and painting should take Art Studio 2, 3, 4 (courses 5 is recommended);  
(b) Students interested in sculpture should take Art Studio 2, 3, 5 (course 4 is recommended);  
(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:  

Minor Program Requirements:  

Art Studio  

Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible).  

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.  

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.  

Coursed in Art Studio (ART)  

Lower Division Courses  

2. Drawing (4) I, II, III. Henderson, Zhang, Schultz and staff  
Laboratory—hours to be arranged—4 hours. Form and composition in black and white.  

3. Drawing II (4) I, II, III. Henderson, Hollowell, Carnvall  
Laboratory—hours to be arranged—4 hours. Pre-requisite: course 2. Form and composition in color.  

Life Drawing (4) III. Hollowell  
Laboratory—hours to be arranged—4 hours. Pre-requisite: course 2. Form in composition using the human figure as subject.  

*Course not offered this academic year.
125. Printmaking: Relief (4) II. Carnwath Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

126. Printmaking: Intaglio (4) III. Atkinson Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Mezzotint, etching, aquatint, and drypoint, burin engraving and related methods. May be repeated once for credit with consent of instructor.

127. Printmaking: Lithography (4) I. The Staff Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: 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 Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: 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.

141. Sculpture: Material Explorations (4) I. Puls Studio—8 hours; Independent study—1 hour. Pre-requisite: 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. The Staff Laboratory—8 hours; 1 hour to be arranged. Pre-requisite: course 2, 3, 4 and 5, or consent of instructor. Introduction to ceramic forms and processes.

143. Sculpture: Ceramics II (4) I. The Staff Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: 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) II. The Staff Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Concepts (4) II. Puls Studio—8 hours; Independent study—1 hour. Pre-requisite: 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) I. The Staff Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: 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.

Group B: Theory and Criticism

147. Theory and Criticism of Photography (4) III. Himelfarb Lecture—3 hours; term paper. Pre-requisite: 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.

148. Theory and Criticism: Painting and Sculpture (4) II. Thiebaud Lecture—3 hours; term paper. Pre-requisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

149. Introduction to Critical Theory (4) I. Rogoff Lecture—3 hours; discussion—1 hour. Pre-requisite: two of Art History 11, 1C, or 185F. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture.

Group C: Special Study Courses

192. Internship (2-12) I, II. The Staff (Chairperson in charge)

193. Seminar in Art Practices (4) I, II. The Staff (Chairperson in charge)

Graduate Courses

201. Experiments in Art and Visual Communication (4) I, II. The Staff Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

202. Seminar (4) I, II, III. Puls, Rogoff, Atkinson and staff Seminar—3 hours. Original work produced for group discussion and criticism; associated topics of contemporary and historical nature. May be repeated for credit.

209. Seminar: Critical Evaluation (1) I. The Staff (Graduate Advisor in charge) Seminar—1 hour. May be repeated for credit. (SU grading only.)

210. Seminar: Comprehensive Qualifying (1) I. The Staff (Graduate Advisor 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. (SU grading only.)

219. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

290. Comprehensive Project (6) III. The Staff (Graduate Advisor in charge) An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be reported once for credit. (SU grading only.)

Professional Courses


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.

*Course not offered this academic year.
Asian American Studies

(College of Letters and Science)

Asian American Studies Program
Program Office, 3102 Hart Hall (916) 752-3625

Committee in Charge
Roy H. Do, Ph.D. (Molecular and Cellular Biology)
Asa Fujimoto, M.A. (Appointed Behavioral Sciences)
Wendy A. Ho, Ph.D. (Asian American Studies,
Women's Studies)
George Kagiwada, Ph.D. (Asian American Studies,
Ph.D. (Asian American Studies)
Peter C.Y. Leung, M.S. (Asian American Studies)
I. Mani, Ph.D. (Women's Studies)
Keith H. Otsuka, Ph.D. (Asian American Studies,
Education)
Bela R. Papp, Ph.D. (Chicana/o Studies)
Diane Wolf, Ph. D. (Sociology)

Faculty
Wendy A. Ho, Ph.D., Assistant Professor
George Kagiwada, Ph.D., Director
Peter C.Y. Leung, M.S., Senior Lecturer
Keith H. Otsuka, Ph.D., Assistant Professor

Program of Study. Currently, Asian American Studies does not offer a major. A minor program, Asian American Studies, is available to students interested in this field of study.

American History and Institutions. This University requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2, 3, (see also under University requirements.)

Related Courses. For courses in Asian languages, see Cantonese (below) and Chinese and Japanese. For other Asian courses, see Chinese and Japanese, and East Asian Studies.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian American Studies ..................................20</td>
</tr>
<tr>
<td>Asian American Studies 101, 110, 112, 130, 192 (No more than 4 units of 192 may be counted toward this total) .............12</td>
</tr>
</tbody>
</table>

Minor Advisor, P.C.Y. Leung

Courses in Asian American Studies

(ASA)

Direct questions pertaining to the following courses to the instructor or to the Asian American Studies Program, 3102 Hart Hall (916) 752-3625.

Lower Division Courses

1. Historical Experience of Asian Americans (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asia in America from the 1840s to the present within the context of the development of the United States. (Offered fall and spring quarters in even-numbered years. Offered winter quarter in odd-numbered years.)

2. Contemporary Experience of Asian Americans (4) I, II, III. Kagiwada
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. (Offered fall and spring quarters in odd-numbered years. Offered winter quarter in even-numbered years.)

20. Calligraphic Expression in Asian American Culture (4) I, II. Leung
Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and apprecia-

tion of calligraphy through some basic writing. Trace origins, principles and styles of Chinese and Japanese caligra

99. Directed Group Study (1-5) I, II, III. The Staff
Lecture (in charge)
Primary intended for lower division students. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Lecture (in charge)
Primary intended for lower division students. (P/NP grading only)

Upper Division Courses

100. Asian American Communities (4) II. Kagiwada
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Analysis of an Asian American community, with the individual as the unit of analysis.

101. Language and Educational Issues of Asian Immigrants (4) I, II. Leung
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in an American society, especially in schools. Overview of public policies on language and programs, particularly for Asian language minority students. Offered in even-numbered years.

102. Theoretical Perspectives in Asian American Studies (4) I. Kagiwada
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.

103. Ethnic Self and Identity (4) III.
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 sciences. Race, ethnicity, economic, race, and gender factors.

104. Asian American Literature (4) II. Ho
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of Asian American writings as expressions of cultural themes, psychological issues, interpersonal relationships, and sociopolitical influences on the Asian American experience.

105. Asian American Experience (4) I. Kagiwada
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the relationship between the Filipino American community, the Philippine American community, and the larger American society through a critical evaluation of the literature.

106. Legal History and the Asian American (4) I.
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; consent of instructor. Legal history of Asian American communities.

191. Internship (1-5) I, II, III. The Staff (Director in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: enrollment dependent on availability of intern position and consent of instructor. Internship in community and institutional settings related to Asian American concerns. (P/NP grading only)

197. Tutoring in Asian American Studies (1-5) I, II, III. The Staff
Lecture—1 hour. Prerequisite: upper division standing and completion of appropriate course with consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor.

198. Directed Group Study (1-5) I, II, III. The Staff
Lecture (in charge)
Primary intended for upper division students. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Lecture (in charge)
Primary intended for upper division students. (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) II-III. Leung
Lecture—2 hours; recitation—2 hours. Prerequisite: course 1-2 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, 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.

*Course not offered this academic year.
Advising Center for the major, as well as for graduate studies, is located in 148 Hoagland Hall, Land, Air, and Water Resources Teaching Center (916-752-1699).

Graduate Study. You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees.

For details see under the Graduate Group in Atmospheric Science. See also the Graduate Studies section in this catalog.

Related Courses. See Environmental Studies 150A; Geography 3, 115, 116; Physics 104A, 104B; Environmental and Resource Sciences 103, 131.

Courses in Atmospheric Science (ATM)

10. Severe and Unusual Weather (3) I. Nathan; III. Carroll
   Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10, high school physics or the equivalent. Extreme weather conditions such as: tornados, thunderstorms, blizzards, hurricanes, and other severe weather phenomena.

30. Issues in Atmospheric Science (2) I. Weane
   Lecture—1 hour; discussion—1 hour. Prerequisite: restricted to students in atmospheric science. This course will cover topics such as: atmospheric phenomena; air mass analysis; use of computer models in meteorology; theories of global climate change; impact of human activities on the atmosphere; and modern meteorological instrumentation.

60. Introduction to Atmospheric Science (4) I. Soong
   Lecture—3 hours; discussion—1 hour. Prerequisite: restricted to students in atmospheric science. The course will cover topics such as: atmospheric phenomena; air mass analysis; use of computer models in meteorology; theories of global climate change; impact of human activities on the atmosphere; and modern meteorological instrumentation.

92. Atmospheric Science Internship (1-12) I, II, III.
   The Staff (Chairperson in charge)
   Internship—3-6 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.)

Special Study for Undergraduates (1-5) I, II, III.
   The Staff (Chairperson in charge)
   (P/NP grading only.)

Upper Division Courses

*105. Microclimate of Agricultural Systems (3) I. Paw U
   Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Oriented for nonmajors. Energy balance, air and soil temperatures, wind, water vapor, carbon dioxide patterns within the microclimate structure. Microclimate modification by windbreaks, frost protection, and other energy balance manipulation. Students who have completed course 133 may receive only one unit of credit. Offered in alternate years.

110A. Weather Analysis and Forecasting (5) I. Carroll
   Lecture—5 hours; laboratory—6 hours. Prerequisite: course 121B (may be taken concurrently). Thermodynamic variables and processes, kinematic and dynamic processes, and their relationship to observed weather. Laboratory work includes thermodynamic diagrams, pressure surface, and vertical cross section analysis.
158. Boundary-Layer Meteorology (4) Ill. Paw U
Lecture—2 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 boundary layer. The microclimate at and near the ground surface.

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. 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) J. Grojahn Lecture—3 hours. Prerequisite: Mathematics 222B, 222C, Physics 98. 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 125. Credit allowed to students having completed any two of these courses.

*221A. Advanced Atmospheric Dynamics I (3) II. Nathan Lecture—3 hours. Prerequisite: course 121B. Shallow water theory and potential vorticity conservation. Mathematical and physical properties of geophysical waves. Wave-wave interactions. Barotropic instability of geophysical flows. Offered in alternate years.

*221B. Advanced Atmospheric Dynamics II (3) III. Nathan Lecture—3 hours. Prerequisite: course 221A. Quasigeostrophic potential vorticity equation for a rotating stratified atmosphere on a sphere. Conditions for instability in stratiﬁed atmosphere; baroclinic instability. Wave-zonal ﬂow interaction theory. Forced waves in the atmosphere. Nonlinear theory of baroclinic instability. Offered in alternate years.


*230. Atmospheric Turbulence (3) II. 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-moment methods. Offered in alternate years.

*231. Advanced Air Pollution Meteorology (3) II. Carroll Lecture—3 hours. Prerequisite: course 149, and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of turbulence, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems are examined. Offered in alternate years.

233. Topics in Advanced Biometeorology (3) II. Paw U Lecture—2 hours discussion—1 hour. Prerequisite: course 133 or consent of instructor. Study of current topics in biometeorology focusing on interactions of plants with the weather. Biological energy budgets and adaptations to changes in energy regime. Quantification of weather parameters for optimum biological response. Offered in alternate years.

240. General Circulation of the Atmosphere (3) II. Grojahn Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum budgets derived and compared with observations. Theoretical framework developed to synthesize observed features. Offered in alternate years.

241. Climate Dynamics (3) III. Weare Lecture—3 hours. Prerequisites: courses 120, 121A, 121B or the equivalent; Applied Science Engineering 115 or the equivalent computer programming experience; course 150 recommended. Dynamics of climatic variations. Global and zonal average energy balance models. Parameterizations of radiative transfer, convection, and ocean circulation. Introduction to primitive equation climate models. Offered in alternate years.

*250. Moser-Scale Meteorology (3) II. 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. Grojahn and Soong Lecture—2 hours laboratory—6 hours. Prerequisites: 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.

270A-G. Topics in Atmospheric Science (1-3) I, II, III. The Staff Discussion—13 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.)

291-A. E. Research Conference in Atmospheric Science (1-3) I, II, III. The Staff Lecture/discussion—1-3 hours. Review and discussion of current literature in: (A) Air Quality Meteorology; (B) Biometeorology; (C) Boundary Layer Meteorology; (D) Climate Dynamics; (E) General Meteorology; May be repeated up to a total of 6 units per segment. (S/U grading only.)

296. 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.)

---

Avian Medicine
See Epidemiology and Preventive Medicine

Avian Sciences
(College of Agricultural and Environmental Sciences)
Barr W. Wilson, Ph.D., Chairperson of the Department
Department Office, 3202B Meyer Hall (916-752-300)

Faculty
Francine A. Bradley, Ph.D., Lecturer
Ralph A. Ernst, Ph.D., Lecturer
Anne J. King, Ph.D., Associate Professor
Kirk K. Klassig, Ph.D., Professor
James R. Milam, Ph.D., Associate Professor
Kathryn Radke, Ph.D., Associate Professor
Wesley W. Weathers, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor

Emeriti Faculty
Ursula K. Abbott, Ph.D., Professor Emerita
Hans Abplanalp, Ph.D., Professor Emeritus
C. Richard Grau, Ph.D., Professor Emeritus
F. Howard Katzner, Ph.D., Professor Emeritus
Frank X. Ogawa, Ph.D., Professor Emeritus
Pran N. Vohra, Ph.D., Professor Emeritus
Wilbur O. Wilson, Ph.D., Professor Emeritus
Allen E. Woodward, M.S., Lecturer Emeritus

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.

*Course not offered this academic year.
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 baccalaureate program that qualifies them for a particular career or they may choose a program that meets other intellectual and cultural interests.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are features emphasized in the avian sciences program. There are laboratory and field facilities for special study housed within the main building as well as at the research farm and the experimental aviary. A student in the avian sciences major has a variety of career options available upon graduation, teaching biology, gamebird production, domestic and foreign agricultural extension and advisory services, government 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 course numbers in parentheses are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

UNITS

English Composition Requirement 0-8
See College requirement

Preparatory Subject Matter 50-54
Avian sciences (Avian Sciences 11 or 13). 3-4
Biological sciences (Biological Sciences 1A, 1B, 1C) 15
Chemistry (Chemistry 2A, 2B, 2C) 15
Computer science (Agricultural Systems and Environment 21) 3
Mathematics (Mathematics 16A, 16B, 16C) 9
Physics (Physics 1A and 1B) 6
Statistics (Statistics 1 and 2) 4

Breadth Subject Matter 24
Satisfaction of General Education requirement 24

Depth Subject Matter 55
Physiological chemistry or biochemistry (Physiological chemistry 21A, 21B, 21C or Biological Sciences 102 and 103) 6
Genetics (Biological Sciences 101) 4
Nuclear (Avian Sciences 150-150L or 151-150L) 11
Physiology (Physiology 110) 6
Laboratory units in above listed subjects 4
(Recommended courses include Animal Science 135, Avian Sciences 150L, Biochemistry 101L, or Physiology 110L.)

Specialized courses related to avian species 25

Restricted Electives 31
To supplement or expand depth subject matter courses

Unrestricted Electives 12-19

Total Units for the Degree 180

Major Advising. A.J. King.
Advising Center for the major is located in 3202 Meyer Hall (916-752-1300).

Minor Program Requirements:

UNITS

Avian Sciences 18
Choose 18 units from Avian Sciences 100, 101, 102, 115, 121, 123, 143, 150, 150L, 151, 151L, Animal Science 143, Physiology 117. One lower division course (Avian Sciences 11, 11L, or 13) can be used to satisfy part of the 18-unit requirement.

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 Economics 130; Animal Science 143; Food Science and Technology 121, Animal Science 143, Physiology 117, Zoology 100, 100L.

Courses in Avian Sciences (AVS)

Lower Division Courses

11. Introduction to Poultry Science (3) I. Bradley

Lecture—3 hours. The role of poultry in the world economy; poultry science and management; nutrition, housing, and management; health, nutrition, and technology; marketing and economics; hatching, rearing, and handling; poultry genetics; and reproduction. (Cross-listed with Animal Sciences 150 and 150L; may be taken concurrently.)

11L. Laboratory in Avian Sciences (1) I. Moriuzzi

Laboratory—3 hours. Principles of avian reproduction, hatchability, egg formation, incubation, hatching, and management of domestic birds. (Cross-listed with Avian Sciences 150 and 150L; may be taken concurrently.)


Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: course in biology recommended. Relationships of man and animals with their environment. Emphasis on ecology; includes analysis of avian evolution and behavior, and management, domestication, agriculture, folklore, art, pollution, and conservation. General Education credit. Environment and Science.

15L. Captive Raptor Management (2) I, II, III.

Moriuzzi

Laboratory—3 hours; independent study—3 hours; one field trip required. Hands-on experience handling and caring for raptors, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential, and long-term exercises.

16L-16LB-16LC. Raptor Migration and Population Fluctuations (2-2-2) I-II-III. Moriuzzi

Fieldwork—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: consent of instructor. Identification of raptor species, assessment of habitat use, and analysis of population and migration patterns. Emphasis on research design and analysis.

98. Internship in the Avian Sciences (1-12) I, II, III.

The Staff (Chairperson in charge)

Internship—3-6 hours. Prerequisite: sophomore standing preferred; consent of instructor. Internship on and off-campus in poulty, gamebirds or exotic birds, production, research, and management. Provided by industry, government, or other agencies. Arrangements are made by students with the department. (P.N.P. grading only.)

199. 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 management of poultry, wild birds, and their products. (P.N.P. grading only.)

Upper Division Courses

100. Principles of Avian Sciences (5) I. Radke

Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction and genetics) that govern the lives of birds. Emphasis on those features of birds, domestic, wild and experimental, which are distinctive.

101. Patterns in Avian Biology (3) I. Weathers

Lecture—3 hours. Prerequisite: Biological Sciences 1B or the equivalent. Patterns of reproduction, locomotion, foraging, growth and development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allometric analysis of life history traits. Offered in alternate years.

102. Fertility and Hatchability (4) I. Abbott

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Biological Sciences 101, Zoology 100. Normal and abnormal events of reproductive strategies and their outcomes, and specific failures resulting from disease, nutritional or genetic causes. Use of avian embryos in biomedical research.

113. Raptor Biology (3) I. Moriuzzi

Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips.

121. Avian Reproduction (2) II. Millam

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Study of avian reproduction, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and domestic birds. Course has a physiological orientation.

123. Management of Companion Birds (3) II. Millam

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Applications of genetic principles in poultry, action of major genes in the control of morphology, reproduction and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

149. Egg Production Management (3) I. Ernst

Lecture—2 hours. Prerequisite: course 11 or the equivalent, or consent of instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and replacing replacement pullets. One Saturday field trip required. Offered in alternate years.

150. Nutrition of Birds (3) I. Klaing

Lecture—1 hour. Prerequisite: Nutrition 110 (may be taken concurrently). Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy, 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) II, III.

Klaing

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.

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.N.P. grading only.)

192. Internship in Avian Sciences (1-12) I, II, III.

The Staff (Chairperson in charge)

Internship—3-6 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.

197. Tutoring in Avian Sciences (1-3) I, II, III. The Staff (Chairperson in charge) Hours and duties vary depending upon being tutored. Prerequisite: Avian Sciences or related major; advanced standing; consent of instructor. Tutoring of students enrolled in the avian sciences courses: weekly conference with instructors in charge of course; written critiques of teaching procedures. (P/NP grading only.)

188. 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 Oncogenesis (4) L. Radke Lecture—3 hours; term paper. Prerequisite: Biological Sciences 163, 104, Zoology 121B, Genetics 102B. Regulation of growth and division of animal cells. Oncogenes, retroviruses and growth factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are stressed.

239. Avian Endocrinology (2) L. Millar Lecture—2 hours; Prerequisite: course work in endocrinology, avian biology or reproductive physiology. Examination of current issues in avian endocrinology with emphasis on endocrine aspects of reproductive physiology. Offered in alternate years.

250. Advanced Poultry Nutrition (3) II. Klausing Lecture—2 hours; discussion—1 hour. Prerequisite: Nutrition 110. Metabolic basis for nutrient requirements in avian species including energy, amino acids, vitamins, and minerals. Discussions on design and analysis of nutritional trials, hormonal control of metabolism, nutritional and metabolic control of nutrient partitioning and gene expression. Offered in alternate years.

260. Topics in Avian Physiological Ecology (2) L. Weathers Lecture—1 hour; seminar—1 hour. Prerequisite: course 100; Physiology 110 or Physiological Sciences 101A-101B; senior or graduate standing. Energy and water requirements of captive and free-living birds. Metabolic requirements for growth, maintenance, reproduction, and thermoregulation. Emphasis given to diversity of patterns found in birds and their ecological correlates. Offered in alternate years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) 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 projects lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion. (SU 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. (SU 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. (SU grading only.)

---

Avian Sciences (A Graduate Group)

A. J. King, Ph.D., Chairperson of the Group
Group Office, 3202 Meyer Hall (916-752-1300)

Faculty. Consists of members from several departments in the College of Letters and Science, and the Schools of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue advanced work in avian sciences. The areas of specialization may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food chemistry, management, ecology, genetics, comparative anatomy, 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. It is expected that the student will have had undergraduate preparation in a field appropriate to the course of study selected. The student will be expected to have had courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Adviser. K. C. Klausing (Avian Sciences).

---

Bacteriology

See Biological Sciences: Section of Microbiology

---

Biochemistry and Biophysics

See Biological Sciences: Section of Molecular and Cellular Biology

Questions pertaining to the following courses should be directed to Biological Sciences: Section of Molecular and Cellular Biology.

Courses in Biochemistry and Biophysics (BCP)

Upper Division Courses

101A. General Biochemistry
This course has been canceled and replaced by Biological Sciences 102.

101B. General Biochemistry (3) I. Carlson Lecture—3 hours. Prerequisite: Biochemistry and Biophysics 101A. Continuation of Biochemistry and Biophysics 101A: the major metabolic pathways of the cell; synthesis and breakdown of sugars, amino acids, nucleic acids, and other metabolites and the bioenergetics involved; the control and integration of metabolism. Last offering: fall quarter 1963. This course will be canceled and replaced by Biological Sciences 103.

---

Biochemistry and Molecular Biology (A Graduate Group)

John W. Herring, Ph.D., Chairperson of the Group
Group Office, 154 Briggs Hall (916-752-9031)

Faculty. Consists of members from the Colleges of Letters and Science, and the Schools 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. Graduate study in biochemistry involves a broad overview plus specialization in one of the following: protein chemistry, cell biology, biochemistry of cancer, and disease. Students are encouraged to develop research interests in areas of current interest and to take courses in related disciplines. For detailed information regarding graduate study, address the chairperson of the group.

Graduate Advisers. E. Bandman (Food Science and Technology), J. F. Hedrick (Molecular and Cellular Biology), D. J. Kimble (Microbiology), J. C. Langer (Molecular and Cellular Biology).

Courses in Biochemistry and Molecular Biology (MBB)

Graduate Courses

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (SU grading only.)

---

Biological Chemistry

See Medicine, School of

---

Biological and Agricultural Engineering

(1993-1994)

Biochemistry and Agricultural Engineering

(1993-1994)

David J. Hillis, Ph.D., Chairperson of the Department
Department Office, 2030 Bainer Hall (916-752-0102)

Faculty

William J. Chancellor, Ph.D., Professor
Petitlaw (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Associate Professor
Robert B. Fidley, Ph.D., Professor
Roger E. Garrett, Ph.D., Professor
D. Ken Giles, Ph.D., Associate Professor
Mark E. Grimes, Ph.D., Associate Professor
Bruce R. Hartsvig, Ph.D., Associate Professor
David J. Hillis, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Associate Professor
Lower Division Courses
15. Wood Properties and Fabrication (2) II. Ramsay
Lecture—1 hour; laboratory—3 hours. Study of wood’s physical properties and behaviors as related to its uses in design, production, and selection.

16. Metal Properties and Fabrication (2) II. J. Ramsey
Lecture—1 hour; laboratory—3 hours. Study of metal properties and techniques for fabrication in metal. Physical principles, design considerations, effects of fabrication techniques on quality and appearance, and evaluation procedures. Experience in working with metal.

17. Plastic Properties and Fabrication (2) II. H. E. Studer
Lecture—1 hour; laboratory—3 hours. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with plastic

Applied Biological Systems Technology

Minor Program Requirements:

Choose one from Applied Biological Systems Technology 170 or 171, or 172.

Principles and Practices requirement—15
Select at least nine units from: Applied Biological Systems Technology 101, 103, 105, 109, 111, 125, 134, 141, 141AT, 145, 147, 161, 163, 165;

Total Units for the Minor (minimum) 40

Minor Advisor: H. E. Studer

Courses in Applied Biological Systems Technology (ABT)

These courses are intended primarily for students not majoring in Biological and Agricultural Engineering. They are available to students who are interested in the study of Biological and Agricultural Engineering.

101. Electric Power Applications (3) II. H. E. Studer
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 109. Principles of electricity and electronics in Biological and Agricultural Engineering equipment. Basic concepts of electricity and electronics in biological and agricultural systems.

105. Computer Application for Measurement and Control (3) II. J. Ramsey
Lecture—2 hours; laboratory—3 hours. Study of computer systems for measurement and control of biological systems.

110. Experiments in Food Engineering (2) II. J. Ramsey
Laboratory—6 hours. Prerequisites: Food Science and Technology 101B and 102B. Laboratory work with computers. Not open for credit to students who have completed Agricultural Engineering Technology 101.

121. Structures and Environmental Control (2) II. H. E. Studer
Lecture—2 hours. Prerequisite: Plant Science 2 or Animal Science 1 or 2. Optimal structure and environments for plants and animals.

125. Environmental Considerations in Home Design III. A. A. A.
Lecture—1 hour; discussion—1 hour. Study of factors to be considered in designing, remodeling, or maintaining housing, including design, choice of materials, energy efficiency, and compatibility with the surrounding environment.

133. Pest Control Practices (2) II. J. Ramsey
Lecture—2 hours. Prerequisite: Botany 120 or Entomology 100 or Environmental Toxicology 111 or Pathology 125 or equivalent. Principles of pest control. Mechanical systems for safe and effective application of pesticides and other materials. Biological, legal, and ethical considerations of pest control.

141. Equipment Technology for Developing Agriculture (2) II. H. E. Studer
Lecture—1 hour. Prerequisite: course 141 or International Agricultural Development 141 (may be taken concurrently). Applied technology (slide-lamp) presentation of machinery, irrigation, and marine equipment technology applications, operation, and maintenance.

145. Water Quality Management for Aquaculture (3) II. H. E. Studer
Lecture—3 hours. Prerequisite: Biological Sciences...
Biological Sciences
(Intercollage Division)
Robert O. Grey, Ph.D., Dean of Biological Sciences
Ronald J. Baskin, Ph.D., Associate Dean—Academic Affairs
Merna R. Villarejo, Ph.D., Associate Dean—Undergraduate Academic Programs
Division Office, Administration, 376 McKrall Hall (916-752-6764)
Division Office, Undergraduate Academic Programs, 66 Briggs Hall (914-758-0410)

The Division of Biological Sciences is an intercollege unit that coordinates campus-wide 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 the major themes of modern biology: Evolution and Ecology; Microbiology, Neurobiology, Physiology, and Behavior; Molecular and Cellular Biology, and Plant Biology. For some of its programs (e.g., core courses, the division-wide Biological Sciences major), the division functions as a single academic department; other programs (e.g., courses and majors in the various core disciplines of biology, research) are the responsibility of individual sections of the division.

The present organizational structure of the division was established on July 1, 1993, replacing the six departments that previously comprised the division: Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology, and Zoology. The revision of the curriculum that accompanies this reorganization will occur over several years. A number of the previous majors will continue, and new courses and majors will be added. Most courses have been renumbered or relocated in new sections to reflect the new organizational structure; these changes are listed in a concordance table which follows "Sections of the Division" below. Students who elect a given major are entitled to complete that major according to the degree requirements listed in the catalog at the time the major is declared.

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" below for a list of faculty in each section.

Programs of Study
Seven majors are offered leading to a B.S. degree in:
Biochemistry
Biological Sciences
Plant Biology (Botany)
Genetics
Microbiology
Physiology
Zoology

Four majors leading to an A.B. degree are offered in:
Biological Sciences
Plant Biology (Botany)
Microbiology
Zoology

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 appropriate college sections in the front of this catalog for more information.

Note: Students in a division major in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry department to cover substantially the same content as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate.

Courses. See "Division-wide Programs and Courses" following "The Major Programs" for descriptions of Biological Sciences courses offered jointly by the sections of the division. See "Sections of the Division" below for descriptions of courses offered by the individual sections.

Note: Most courses have been renumbered or relocated to new sections as a result of the reorganization. A concordance table identifying the previous course number and location of the major course is provided in the "Sections of the Division." See the appropriate section location for "The Sections of the Division.

Student Services. Student affairs officers at the division's Undergraduate Academic Programs Office, 56 Briggs Hall, and advising staff in each section office provide information and counseling on the major programs and courses offered by the sections of the division.

The Major Programs
The division offers two categories of majors. One is the Biological Sciences major, which is offered by the entire division. 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 the molecular to the population level. While emphasizing breadth, the Biological Sciences major also features an area of emphasis requirement which provides concentrated attention to one facet of biology at the upper division level. Each area of emphasis coincides with one of the sections of the division. More specialized majors that focus on one of the core disciplines are offered through individual sections of the division and listed under "Majors in the Core Disciplines of Biology."

Division-wide Biological Sciences Major
(Secions of Evolution and Ecology, Microbiology, Molecular and Cellular Biology, Neurobiology, Physiology, and Behavior, and Public Policy)
The Program. Students select either a Bachelor of Science or Bachelor of Science program in Biological Sciences. The core program for both degrees includes mathematics, general and organic chemistry, and courses in biology that emphasize breadth as well as depth. Either program can be used to satisfy requirements for admission to graduate schools, leading either to a variety of professional health careers, or further study in basic and applied areas of biology. The Bachelor of Science program focuses on the natural sciences. The Bachelor of Arts program requires fewer units in the natural sciences, allowing students to take more courses in the humanities and social sciences.

Career Alternatives. The biological sciences degree provides suitable preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. It is an excellent background for students wishing to enter a graduate program in biology, a teacher-training program, a health professional school, or other professional schools.

*Course not offered this academic year.
### B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 16A: 15A-16C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 2A-B2-CC</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry 2A-6B or 116A-118B</td>
<td>14</td>
</tr>
<tr>
<td>Statistics 1B-1A</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 1B-1C</td>
<td>15</td>
</tr>
<tr>
<td>Statistics 3A-22-10</td>
<td>4-5</td>
</tr>
<tr>
<td>Statistics 5A-5B-SC</td>
<td>3</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>45 units</td>
</tr>
<tr>
<td>Biological Sciences 101, 102, 103, 104...</td>
<td>13</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>32</td>
</tr>
</tbody>
</table>

**Microbiology emphasis (four options, a through d, below):**

1. **Field requirement**: Take Microbiology 102 to satisfy Field requirement (c).

2. **Laboratory requirement**: Students must take Microbiology 102L to satisfy the restricted elective lab requirement.

3. **Options**: Complete one of the four clusters (options a-d) below, or complete an independent cluster with approval from your faculty adviser.

   **(a) Microbial Physiology and Molecular Genetics option (in the Microbiology emphasis):**

   - Microbiology 130A... | 3 |
   - Microbiology 130B... | 3 |
   - Microbiology 130C... | 3 |
   - Select six or more units from the following courses: Microbiology 123L, 127L, Molecular and Cellular Biology 121, 123, 141, 161... | 6 |

   **(b) Microbial Diversity and Ecology option (in the Microbiology emphasis):**

   - Microbiology 162... | 5 |
   - Select three or more units from the following: Geology 111B; Microbiology 120, 120L; Plant Biology 118; Soil Science 111... | 3 |

   **(c) Biotechnology and Applied Microbiology option (in the Microbiology emphasis):**

   - Microbiology 130A... | 3 |
   - Select one course from: Food Science and Technology 102, 104, or Viticulture and Enology 186... | 3 |
   - Select six or more units from the following: Chemical Engineering 161; Microbiology 110, 130L; Molecular and Cellular Biology 121, 122, 123, 170L... | 6 |

   **(d) Medical Microbiology option (in the Microbiology emphasis):**

   - Veterinary Microbiology and Immunology 127 or 132... | 5 |
   - Microbiology 162 or Veterinary Microbiology and Immunology 128... | 3 |
   - Medical Microbiology 107 or Veterinary Microbiology and Immunology 128... | 3 |

**Molecular and Cellular Biology emphasis...**

1. **Molecular biology and gene expression**: One course from Molecular and Cellular Biology 121, 141, 161... | 3-4 |
2. **Laboratory experience**: One or more laboratory courses from Molecular and Cellular Biology 120L, 140L, 160L, or other laboratory course that emphasizes cellular or molecular biology with approval from your adviser... | 3-4 |
3. **Restricted electives**: Additional units from Biological Sciences 120, Molecular and Cellular Biology 123, 126, 141, 142, 150, 151, 162, 163, Medical Microbiology 107; Neurobiology, Physiology and Behavior 100B; Plant Biology 125; Veterinary Microbiology and Immunology 126 or other courses with approval from your adviser... | 3-4 |

### Areas of Emphasis:

**Evolution and Ecology emphasis...**

1. **Field requirement**. Student must take Evolution and Ecology 100 to satisfy Field requirement (a), and Evolution and Ecology 101 to satisfy Field requirement (b).
2. **Evolution and Ecology 102**... | 3 |
3. **Biodiversity**: Six or more units, to include at least two units (or 6 quarter hours) of lab, from the following: Entomology 100, 100L, 107, 109; Evolution and Ecology 112, 112L, 134, 134L, 136, 137L, 137L; Geology 107, 107L, 145, 146; Microbiology 105; Nematozoa 110; Plant Biology 101, 102, 108, 118, 119; Wildlife and Fisheries Biology 110, 111, 111L, 120, 120L... | 6-9 |
4. **Restricted electives**: One from the following: Entomology 103, 104, 105, 106, 106L; Environmental sciences 121, 126, 150A, 150B, 150C, 151, 151L; Evolution and Ecology 105, 106, 117, 148, 149, 149L, 170L; Geology 107, 107L, 145, 146; Nematozoa 110; Neurobiology, Physiology and Behavior 155; Philosophy 108; Plant Biology 116, 121; Wildlife and Fisheries Biology 130... | 3-5 |

**Neurobiology, Physiology and Behavior emphasis...**

1. **Neurobiology, Physiology and Behavior 100**: Take Microbiology 120A, 120F, 143L; Psychology 108... | 3 |
2. **Biological Sciences 104, 121**:
   - Entomology 102; Evolution and Ecology 170; Introduction to Neurobiology and Behavior 100B; 100L, 100T, 110L, 111A, 111B, 111C, 113, 144, 170, 170T; Geology 107, 107L, 145, 146; Nematozoa 110; Neurobiology, Physiology and Behavior 155; Philosophy 108; Plant Biology 116, 121; Wildlife and Fisheries Biology 130... | 3-5 |

**Behavior; Anthropology 154A, 154B; Entomology 104; Environmental Studies 129; Neurobiology, Physiology and Behavior 155.**

**Plant Biology emphasis...**

1. **Select one course from each of the following four areas:**
   - **(1) Anatomy and morphology**: Evolution and Ecology 140; Plant Biology 105, 116, 118... | 4-5 |
   - **(2) Physiology and development**: Plant Biology 111, 112, 125; Plant Pathology 130... | 4-5 |
   - **(3) Evolution and ecology**: Evolution and Ecology 100; Plant Biology 117; Plant Science 103... | 4 |
   - **(4) Applied plant biology**: Agronomy 100; Plant Science 109, 112, 113, 140... | 3-4 |

**Total Units for the Major...**

### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 2A-2B</td>
<td>10</td>
</tr>
<tr>
<td>Chemistry 2A-6B or 116A-118B</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics and statistics</td>
<td>15</td>
</tr>
<tr>
<td>Recommended: Chemistry 2C; Physics 5A-5B-SC; 1 course in computer programming...</td>
<td>30</td>
</tr>
</tbody>
</table>

**Note**: A course in computer programming may be acceptable toward satisfying of the mathematics/statistics requirement with prior approval from the Dean.

**Depth Subject Matter...**

1. **Select one course from each of the three area requirements**: animal biology, microbiology, and plant biology (see "Course List for Group Requirement" below), and (2) at least 3 units from each of the three area requirements: animal biology, microbiology, and plant biology (see "Course List for Area Requirement" below).

**Course List for Group Requirement**

1. **Organismal biology**: Entomology 101, 102, 103; Evolution and Ecology 106, 112, 133, 134, 136, 137; Microbiology 105, 162, and Biological Sciences 150; Plant Biology 102, 105, 108, 118, 119; Veterinary Microbiology and Immunology 127, 128; Wildlife and Fisheries Biology 111, 120...
2. **Population biology and ecology**: Anthropology 154A, Entomology 104; Environmental Studies 103, 121; Evolution and Ecology 161, 102, 144; Geology 150C; Microbiology 120; Plant Biology 117; Wildlife and Fisheries Biology 110, 151...
3. **Evolutionary biology**: Anthropology 151, 152; Evolution and Ecology 103, 107; Plant Biology 116; Plant Science 103...
4. **Ecological studies**: Microbiology 130A-130B; Neurobiology, Physiology and Behavior 110, 117, 142, 143; Plant Biology 111, 112; Plant Pathology 130...
5. **Biochemistry and cell biology**: Biological Sciences 102 and 103 (or Biological Sciences 102 and Biochemistry 107B fall quarter 1993 only); Biological Sciences 104; Botany/Zoology 130 (fall quarter 1993 only); Physiology 100A and Neurobiology, Physiology and Behavior 100B (fall quarter 1993 only); Plant Biology 125...

**Course List for Area Requirement**

1. **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 Studies 129; Evolution and Ecology 100, 101, 105, 112, 133, 134, 136, 137, 138, 139, 140, 141, 142, 143, 144; Molecular and Cellular Biology 150; Nematology 110; Neurobiology, Physiology and Behavior 155; Wildlife and Fisheries 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 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 116 or 119 may be used for either microbiology or plant biology (not both).

Total Units for the Major..................................................73-79

Other Upper Division Courses
A list of courses that will be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Undergraduate Academic Programs Office, 66 Briggs Hall.

There is a limitation of 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 190B may be counted.

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 Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194H. Complete details must be obtained from the Undergraduate Academic Programs Office, 66 Briggs Hall, before starting in the Honors Program.

The Division of Biological Sciences also 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 undergraduate research project.

The division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation. For further details on these awards and awards, contact the Undergraduate Academic Programs Office, 66 Briggs Hall.

The Minor Program
The minor in Biological Sciences is designed to acquaint 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 enrollment in pre-requisite preparatory work. Substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on certification of completion of the minor program can be obtained from the division's Undergraduate Academic Programs Office, 66 Briggs Hall.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Biological Sciences</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1C</td>
<td>5</td>
</tr>
<tr>
<td>Biological Sciences 101</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units (see area and group requirements below)</td>
<td>15</td>
</tr>
<tr>
<td>Upper division biological sciences courses to include</td>
<td>15</td>
</tr>
</tbody>
</table>

Mathematics 16A-16B-16C or 21A-21B-21C

Physics 5A-5B-5C

Statistics 13, 32, 100, or 102

Depth Subject Matter..................................................64-88

| Biological Sciences 101, 102, 103, 104 | 13 |
| Chemistry 118A-118B-118C or 12A-12B-12C | 13 |
| Chemistry 170A-170B-170C | 12 |
| Molecular and Cellular Biology 120L, 121L, 122, 123, 138 | 16 |
| Restricted Electives | 4 |
| Upper division courses in biology sciences or chemistry. Students are encouraged to obtain additional laboratory experience, including 199 research; however, no more than 3 units of 199 may be counted toward Restricted Elective units. | 13 |
| Total Units for the Major..........................................108-113

Master Adviser: L.R. Sorensen (Section of Molecular and Cellular Biology), 126 Briggs Hall,

Advising Center for the major is located in 156 Briggs (916-752-9032).

Graduate Study, See Biochemistry and Molecular Biology (A Graduate Group); and the Graduate Studies section in this catalog.

The Genetics Major Program

(Section of Molecular and Cellular Biology)

The genetics major is designed to provide 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 four course upper division common curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Genetics majors 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 and participation in a seminar course in molecular genetics.

Career Alternatives. The genetics degree provides suitable preparation in 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:

Preparatory Subject Matter.............................................60-70

| Biological Sciences 1A-1B-1C | 15 |
| Chemistry 2A-2B-2C | 15 |
| Chemistry 8A-8B or 11A-11B-11C | 15 |
| Mathematics 16A-16B-16C or 21A-21B-21C | 15 |
| Physics 5A-5B-5C | 12 |
| Statistics 13, 32, 100, or 102 | 12 |

Depth Subject Matter..................................................48-51

| Biological Sciences 101, 102, 103, 104 | 13 |
| Molecular and Cellular Biology 120L, 121L, 163, 178 | 9 |
| Evolution and Ecology 100 | 4 |

B.S. Major Requirements:

Preparatory Subject Matter.............................................64-88

| Biological Sciences 1A-1B-1C | 15 |
| Chemistry 2A-2B-2C | 15 |

*Course not offered this academic year.*
est chosen in consultation with the adviser. No more than 4 units of 192, 139, or 199 can be used for credit in this category.

Total Units for the Major: 108-121

Master Adviser: Contact R.S. Hawley (Molecular and Cellular Biology)

Advising Center for the major is located in 357 Briggs Hall (916-752-2022).

Graduate Study. The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics.

Related Courses. See Anatomy 207, 221, 222, 223, 224, 225, Animal Genetics 107, 108, 109, 204, 206, 207, 208, Anthropology 151, 152, 153, 157, 157L, Biological Chemistry 217, Evolution and Ecology 100, 149, Genetics Graduate Course groups: Molecular and Cellular Biology 121, 251C, Plant Pathology 215, Plant Science 103, 113, 122, Psychology 251, Vegetable Crops 220, 220L, 221K. 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, biochemistry, 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. Its study helps us understand the regulation of microbial physiology and metabolic processes. These studies provide insight into the functioning and control of microbial diseases and the production of antibiotics and other useful compounds.

The Program. Both undergraduate major programs in microbiology provide a background in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. degree program emphasizes microbiology, while the B.S. degree program includes more biochemistry and related course work. Either program, with judicious course selection, is suitable for students contemplating a career in medicine or related health professions, including medical technology, teaching, or a career in industry. 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 Program is designed to be flexible 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, pharmaceutics, 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:\n
<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Preclinical B.S.</th>
<th>Preclinical B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B, 1C</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry 2A-2B</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Physics 1A-1B</td>
<td>6-8</td>
<td>6-7</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biological Sciences 103</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiology 102, 105L, 105, 130A</td>
<td>14</td>
</tr>
<tr>
<td>Microbiology 162 or Veterinary Microbiology and Immunology 128</td>
<td>3-4</td>
</tr>
<tr>
<td>Two of the following: Microbiology 120-120L, 130B-130L, 177-177L</td>
<td>10-11</td>
</tr>
<tr>
<td>Additional units from Microbiology 110, 120, 120B, 130L, 177, 177L, Molecular and Cellular Biology 120L, Plant Biology 114, 118, 119, 125 or Veterinary Microbiology and Immunology 126, 127</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Units for the Major: 85-101

B.S. Major Requirements:\n
<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Preclinical B.S.</th>
<th>Preclinical B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B, 1C</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry 2A-2B, 2C</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Chemistry 8A-8B or 118A-118B, 8C</td>
<td>6-12</td>
<td></td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Statistics 13, 32, 100 or 102</td>
<td>3-4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biological Sciences 103</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular and Cellular Biology 120L</td>
<td>6</td>
</tr>
<tr>
<td>Microbiology 102, 105L, 105, 130A, 130B</td>
<td>17</td>
</tr>
<tr>
<td>Microbiology 162 or Veterinary Microbiology and Immunology 128</td>
<td>3-4</td>
</tr>
<tr>
<td>One of the following: Food Science and Technology 104-104L; Microbiology 120L-120L, 130L, 177-177L; Molecular and Cellular Biology 161-170L, Soil Science 111; Veterinary Microbiology and Immunology 127</td>
<td>3-7</td>
</tr>
<tr>
<td>Three additional units from Food Science and Technology 104L, Medical Microbiology 107, Molecular and Cellular Biology 110, 119, 120L, 120L, 130L, 177, 177L, 199; Molecular and Cellular Biology 161, 170L; Plant Biology 114, 118, 119, Soil Science 111; Veterinary Microbiology and Immunology 127</td>
<td>12</td>
</tr>
</tbody>
</table>

Total Units for the Major: 105-117

Master Adviser: M.L. Wheelis (Section of Microbiology), 202 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. The offerings of the Section of Microbiology are augmented by courses and faculty of the Departments and Sections of Evolution and Ecology, Food Science and Technology, and Plant Sciences and Resources; Molecular and Cellular Biology; Plant Pathology; Plant Biology; Virology and Ecology; and the School of Medicine and Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Section of Microbiology.

Related Courses. For other courses related to microbiology, see course offerings in the Division of Biological Sciences, the School of Medicine and Preventive Medicine; Food Science and Technology; Land, Air and Water Resources; Medical Microbiology; Plant Pathology; Plant Science; and Veterinary Microbiology and Immunology. Faculty of the Section of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10, and 19.

The Physiology Major Program (Section of Neurobiology, Physiology, and Behavior)

The study of physiology is concerned with understanding the mechanisms that control and carry out the vital functions of living organisms. From the single cell and its parts, through the various organ systems, to the whole organism and its relationship to its environment—the entire range of function of living matter is investigated.

The Program. An understanding of physiology must be based on a broad scientific background. In the freshman and sophomore years, physiology majors take courses in chemistry, biology, physics, and mathematics. As juniors or seniors, majors can enroll in a variety of physiology courses along with upper division courses in related sciences. With this background, 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 physiology major provides the foundations for a challenging career in physiology 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 research and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

B.S. Major Requirements:\n
<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Preclinical B.S.</th>
<th>Preclinical B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B, 1C</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry 2A-2B, 2C</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Chemistry 8A-8B or 118A-118B, 8C</td>
<td>6-12</td>
<td></td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>9-12</td>
<td></td>
</tr>
<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Statistics 13, 32, 100 or 102</td>
<td>3-4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biological Sciences 103</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiology Core Requirements: Neurobiology, Physiology, and Behavior 100B, 100L, 110-111, and either 111A or 111B, 111C</td>
<td>13</td>
</tr>
<tr>
<td>Additional Physiology Depth Unit Requirements:</td>
<td>9</td>
</tr>
<tr>
<td>(Courses 106, 107, 108, 194HD, 194HC, 196A, 196B, 197, 198, 199 may not be used to meet Physiology Depth Requirements.)</td>
<td>12</td>
</tr>
</tbody>
</table>

Restricted Electives: Under division science units to be chosen: Morphology requirement: Anatomy 100 or Anthropology 155 or Molecular and Cellular Biology 146 or 150-150L. (Courses 106, 190, 191, 194A, 194HD, 196A, 196B, 197, 198, 199 may not be used for Restricted Electives.)

Total Units for Major: 109-119

Master Adviser: J. Goldberg (Section of Neurobiology, Physiology, and Behavior), 191 Briggs Hall.

Advising Center. 196 Briggs Hall (916-752-9666).

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, Section of Neurobiology, Physiology, and Behavior. See also the Graduate Studies section in this catalog.

The Plant Biology Major Program

Plant biology is the study of plants as organisms. It includes the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, ecology, and evolution, along with the newer disciplines of cellular and molecular plant biology.

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) applied plant biology, 2) plant evolution and ecology, 3) general plant sciences, 4) plant pathology, physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization.

Career Alternatives. Plant biologists may teach, conduct research, or hold administrative positions. They are employed by educational institutions, federal and state agencies such as the U.S. Department of Agriculture, the Forest Service, Environmental Protection Agency, and private industry. Some plant biologists will have careers in the pharmaceutical, petroleum or chemical industries, seed companies, botanical gardens, plant nurseries, conservation work, and a developing field of plant biotechnology will offer challenging careers to botanically trained graduates, and many elect to continue study toward advanced degrees.
Plant Biology (Botany), A.B. Major Requirements:

Preparatory Subject Matter: 35

- Biological Sciences 1A-1B-1C
- Chemistry 2A-2B, 8A-8B
- Agricultural Science and Management 150 or
  Statistics 13 or 100 or 102
- Depth Subject Matter: 41-42

- Biological Sciences 101
- Plant Biology 102 or 108
- Evolution and Ecology 140 or Plant Biology
- Plant Biology 105, 111, 112, 117
- Additional upper division units in Plant Biology
  or related natural science courses...13-14

Total Units for the Major: 76-77

Recommended

- Chemistry 2C, Evolution and Ecology 100, Plant
  Biology 118, 119.

For students with interests in specialized areas of
plant biology (e.g., agrobiology, 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 advisor.

B.S. Major Requirements:

Preparatory Subject Matter: 60-61

- Biological Sciences 1A-1B-1C
- Chemistry 2A-2B-2C
- Chemistry 8A-8B
- Mathematics 16A-16B-16C
- Physics 5A-5B-5C
- Agricultural Science and Management 150 or
  Statistics 13, 32, 100, or 102

Depth Subject Matter: 45

- Biological Sciences 101 through 105
  (Students completing the Applied Plant
  Biology Area of Emphasis should take
  Plant Science 125)
- Biological Sciences 102, 103, 104, 109
- Plant Biology 105, 111, 118, 119
- Completion of one Area of Emphasis listed
  below...

(1) Applied plant biology:
- Plant Biology 112
- Plant Science 101 or 103
- Plant Science 140
- Molecular and Cellular Biology 120
- Plant Biology 111L, Plant Science 107L,
  112L, 140L, or Vegetable Crops 101L
- Additional upper division coursework
  from the Applied Plant Biology emphasis
  area course list to achieve a total of 24 or
  more units (Plant Science 145 recom-
  mended)

(2) Plant ecology and evolution:
- Evolution and Ecology 100
- Plant Biology 117 or Plant Science 101
- One course from the Applied Plant Biology
  emphasis area course list (Plant
  Science 145 recommended)
- Additional upper division coursework
  from the Plant Ecology and/or Plant Evolu-
  tion and Diversity emphasis area
  course list to achieve a total of 24 or
  more units...

(3) General plant biology:
- Evolution and Ecology 100, Plant Biology
  112
- Plant Biology 117 or Plant Science 101

One course from the Applied Plant Biology
emphasis area course list (Plant
Science 145 recommended)...3-5

- One course from the Evolution and Diver-
  sity emphasis area course list...
- Additional upper division coursework
  from any of the four emphasis areas
  course lists, chosen in consultation with
  an adviser, to achieve a total of 24 or
  more units...

(4) Plant physiology, development and mou-
  lcular biology:
- Plant Biology 112
- Molecular and Cellular Biology 120L,
  170L, Plant Biology 111L or Plant Sci-
  ence 107L
- One course from the Applied Plant Bi-
  ology emphasis (Plant Science
  145 recommended)
- One course from the Plant Ecology
  emphasis area course list...
- One course from the Plant Evolution
  and Diversity emphasis area course list...

Emphasis Area Course Lists

Applied Plant Biology emphasis area:
- Agronomy 112, 120, 132, Agricultural Science 100
- Entomology 100, 101, 102, 110, 112, 118, 119,
  125, 135, Environmental Horticulture 105,
  106, 120, 125, 130, 133, Environmental Toxicology 101
- International Agricul-
  ture Development 101
- Soil Science 100, 102, 105, 111
- Vegetable Crops 101
- Additional upper division coursework
  from the Plant Physiology, Development,
  and Molecular Biology emphasis area
  course list to achieve a total of 24 or
  more units...

Evolution and Diversity emphasis area:
- Evolution and Ecology 100, 102, 106, 140, 144
- Plant Biology 102, 108, 116, 118, 119
- Plant Science 103, Vegetable Crops 105
- Additional upper division coursework
  from the Plant Evolution and Diversity
  emphasis area course list...

Minor Program Requirements:

- Biological Sciences 101 or 103
- Molecular and Cellular Biology 120
- Plant Biology 111L, Plant Science 107L, 112L,
  140L, or Vegetable Crops 101L
- Additional upper division coursework
  from the Plant Biology emphasis
  area course list to achieve a total of 24 or
  more units...

Master Adviser, Contact the Plant Biology Section
Office, 143 Robbins Hall.

A.B. Major Requirements:

Preparatory Subject Matter: 41-45

- Biological Sciences 1A-1B-1C
- Chemistry 2A-2B, 8A-8B
- Mathematics 16A-16B or Statistics 102
- Physics 1A-1B or 5A-5C

Depth Subject Matter: 36

- Biological Sciences 101 or Botany/Zoology
- Biological Sciences 130 (fall quarter 1993 only)
- Zoology 121A and Molecular Cellular Biology
  141 (1993-94 only)
- Additional upper division coursework in biolog-
  ical science to achieve a total of 36 or
  more units...

Include at least:
- Biological Sciences 101 or Botany/Zoology
B.S. Major Requirements:

**Preparatory Subject Matter**

- Biological Sciences 1A-1B-15
- Chemistry 2A-2B-2C
- Chemistry BA-BS or 18A-18B-18C
- Mathematics 16A-16B-16C or 21A-21B-21C
- Physics 5A-5B-5C

**Depth Subject Matter**

- Biological Sciences 101, 102, 103, 104, 105
- Evolution and Ecology 100, 101, 102, 103, 104, 105, 106
- Statistics 100, 102 or 130A-130B

Additional upper division course work in biological science to achieve a total of 49 or more units:

- 16-20 units

- Include at least:
  - (a) 2 units (6 hours/week) of laboratory, and
  - (b) one course from each of the areas of study shown below.

Areas of Study:

1. **Biodiversity and Ecology**
   - Entomology 100, 105, 107, 109
   - Plant Biology 101, 108, 118, 119
   - Wildlife and Fisheries Biology 110, 113, 111, 112, 120, 120A, 120B

2. **Physiology and Functional Morphology**
   - Entomology 102
   - Evolution and Ecology 105, 133, 170, 172
   - Plant Biology 111, 112, 112

Note: A maximum of 4 units of variable unit courses (numbered 192, 196, 199) may be applied to upper division elective requirements. Zoology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 197 are not applicable to the upper division elective unit requirement.

**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 advisor approval. Other elective courses are approved on an individual basis by petition through an advisor.

- Anthropology 100
- Anthropology 151, 152, 153, 154A, 154B, 155, 156
- Biological Sciences, all upper division courses
- Chemistry 107A, 107B
- Clinical Pathology 101, 101
- Entomology, all upper division courses except 110, 115
- Environmental Studies 110, 116, 121, 123, 150C, 151, 152
- Geology 106, 107, 107L, 111A, 111B, 145, 146, 150C
- Microbiology, all upper division courses.

Molecular and Cellular Biology, all upper division courses

- Neurobiology 110
- Neurobiology, Physiology and Behavior, all upper division courses
- Nutrition 110, 111
- Philosophy 105
- Plant Biology, all upper division courses
- Psychology 128, 129, 134, 150
- Veterinary Microbiology and Immunology 126, 126L, 126T
- Wildlife and Fisheries Biology 120, 120L, 121

**Total Units for the Major**

- 106-115

**Major Advisers:** Students transferring to Davis from another institution and majoring in Zoology may 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 Stever Hall (510-752-6262).

**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.

**Division-wide 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 (BML) located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the following areas of marine biology: 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 a faculty member.

The program is residential, and students are housed on the laboratory grounds. Participants are responsible for a room and board fee in addition to standard campus registration fees.

**Application Requirements:** Forms can be obtained from the Division of Biological Sciences. Applications are due on or before the pre-registration deadline for spring quarter. Additional information on the Bodega Marine Laboratory Program is available from the Undergraduate Academic Programs—Division of Biological Sciences Office, 56 Briggs, or by mail, directly, (707) 875-2011, P.O. Box 247, Bodega Bay, CA 94923.

**Courses in Biological Sciences (BIS)**

**Lower Division Courses**

1. **Introductory Biology (5)**
   - 1A. Introductory Biology (5)
     - 1A. Introductory Biology (5)
     - 1B. Introductory Biology (5)
     - 1C. Introductory Biology (5)

2. **Biological Sciences**
   - 1A. Introductory Biology (5)
   - 1B. Introductory Biology (5)
   - 1C. Introductory Biology (5)

3. **Ecology and Behavior, Environmental Studies**
   - 1A. Ecology and Behavior (5)
   - 1B. Ecology and Behavior (5)

4. **Neurobiology**
   - 1A. Neurobiology (5)
   - 1B. Neurobiology (5)

5. **Physiology**
   - 1A. Physiology (5)
   - 1B. Physiology (5)

6. **Microbiology**
   - 1A. Microbiology (5)
   - 1B. Microbiology (5)

7. **Nutrition**
   - 1A. Nutrition (5)
   - 1B. Nutrition (5)

8. **Psychology**
   - 1A. Psychology (5)
   - 1B. Psychology (5)

9. **Virology**
   - 1A. Virology (5)
   - 1B. Virology (5)

10. **General Botany**
    - 1A. General Botany (5)
    - 1B. General Botany (5)

11. **General Zoology**
    - 1A. General Zoology (5)
    - 1B. General Zoology (5)

12. **General Ecology**
    - 1A. General Ecology (5)
    - 1B. General Ecology (5)

13. **General Microbiology**
    - 1A. General Microbiology (5)
    - 1B. General Microbiology (5)

14. **General Physiology**
    - 1A. General Physiology (5)
    - 1B. General Physiology (5)

15. **General Virology**
    - 1A. General Virology (5)
    - 1B. General Virology (5)

16. **Environmental Studies**
    - 1A. Environmental Studies (5)
    - 1B. Environmental Studies (5)

17. **Nutrition**
    - 1A. Nutrition (5)
    - 1B. Nutrition (5)

18. **Psychology**
    - 1A. Psychology (5)
    - 1B. Psychology (5)

19. **Virology**
    - 1A. Virology (5)
    - 1B. Virology (5)

20. **General Botany**
    - 1A. General Botany (5)
    - 1B. General Botany (5)

21. **General Zoology**
    - 1A. General Zoology (5)
    - 1B. General Zoology (5)

22. **General Ecology**
    - 1A. General Ecology (5)
    - 1B. General Ecology (5)

23. **General Microbiology**
    - 1A. General Microbiology (5)
    - 1B. General Microbiology (5)

24. **General Physiology**
    - 1A. General Physiology (5)
    - 1B. General Physiology (5)

25. **General Virology**
    - 1A. General Virology (5)
    - 1B. General Virology (5)

26. **Environmental Studies**
    - 1A. Environmental Studies (5)
    - 1B. Environmental Studies (5)

27. **Nutrition**
    - 1A. Nutrition (5)
    - 1B. Nutrition (5)

28. **Psychology**
    - 1A. Psychology (5)
    - 1B. Psychology (5)

29. **Virology**
    - 1A. Virology (5)
    - 1B. Virology (5)

30. **General Botany**
    - 1A. General Botany (5)
    - 1B. General Botany (5)

31. **General Zoology**
    - 1A. General Zoology (5)
    - 1B. General Zoology (5)

32. **General Ecology**
    - 1A. General Ecology (5)
    - 1B. General Ecology (5)

33. **General Microbiology**
    - 1A. General Microbiology (5)
    - 1B. General Microbiology (5)

34. **General Physiology**
    - 1A. General Physiology (5)
    - 1B. General Physiology (5)

35. **General Virology**
    - 1A. General Virology (5)
    - 1B. General Virology (5)
Background in both modern and classical approaches to understanding genome evolution, gamete interaction and fertilization, 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. Clark, Jeffery (Molecular and Cell 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.)

121P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (6) III. Clegg (Molecular and Cellular Biology), Chang (Neurobiology, Physiology and Behavior) Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Biological Sciences 102 and 103; Physics SA-SS-SC; course 123 (concurrently). Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (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. Modelling 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 (4) 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 speakers. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)

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 field 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 advisors. (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.)

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) III. 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. (SU 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 (916-752-1272)

Faculty

Primary Section Members
Michael G. Barbour, Ph.D., Professor, Academic Senate Distinguished Teaching Award
James A. Doyle, Ph.D., Professor
Olaf W. J. Eilers, Ph.D., Assistant Professor
John H. Gillespie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Richard K. Grinnell, Ph.D., Professor
Charles H. Longley, Ph.D., Professor
Marc Mangel, Ph.D., Professor
Marc R. Reisman, Ph.D., Associate Professor
Thomas W. Schoener, Ph.D., Professor
H. Bradley Shaffer, Ph.D., Associate Professor
Arthur M. Shapiro, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Judy A. Stamps, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Donald R. Strong, Ph.D., Professor
Catherine A. Toft, Ph.D., Professor
Michael Turill, Ph.D., Professor

Secondary Section Members
Peter R. Marler, Ph.D., Professor
Robert W. Pearcy, 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
Milan A. Miller, Ph.D., Professor Emeritus
Timothy Schut, Ph.D., Professor Emeritus
Lauren E. Rosenberg, Ph.D., Professor Emeritus
Robert L. Rudd, Ph.D., Professor Emeritus
George W. Satt, Ph.D., Professor Emeritus
G. Lydeard Stubbins, Ph.D., Professor Emeritus
Kenneth E. Watt, Ph.D., LL.D., Professor Emeritus
Grady L. Webster, Ph.D., Professor Emeritus
Stephen L. Wolfe, Ph.D., Lecturer Emeritus

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. Former course Zoology 92. (P/NP grading only.)

99. Special Study for Lower Division Students (1-12) I, II, III. The Staff (Chairperson in charge) Former course Zoology 99. (P/NP grading only.)

Upper Division Courses

100. Introduction to Evolution (4) I. Langley, II. Turell, III. Stanton Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, and 101, and Mathematics 16A, 16B, 16C or the equivalent. A general survey of the principles of ecology. Former course Zoology 128.

102. Advanced Evolution (4) II. Doyle, Gillespie Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Advanced topics and current issues in microevolution and macroevolution, including population genetics, quantitative genetics, evolutionary stable strategies, speciation, phylogeny reconstruction, analyses of fossil and molecular data, macroevolutionary mechanisms, and global diversity trends. Former course Genetics 102.

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 class of vertebrates is described and interpreted in terms of phylogeny. Former course Zoology 105.

106. Evolutionary Quantitative Genetics (4) II. Turell Lecture—3 hours; discussion—1 hour. Prerequisite: course 102, Mathematics 16C, and Statistics 102. Experimental and theoretical analysis of polygenic traits. Topics include classical experiments and methods of analysis as well as modern theoretical treatments with emphasis on applications to microevolution and macroevolution. Offered in alternate years. Former course Genetics 106.

112. Invertebrate Zoology (4) II. Grosberg Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; course 112L (concurrently); courses in systems, ecology, and evolution recommended. Survey of the invertebrate phyllum emphasizing aquatic forms and focusing on morphology, development, natural history, and phylogenetic relationships. Former course Zoology 112.

112L. Laboratory for Invertebrate Zoology (3) II. Grosberg 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. Former course Botany 117. Students taking course 117 cannot receive credit for

*Course not offered this academic year.
molecular biology of insect pathogens. Insect immu-
ity. 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 (3) II. Meeks
Laboratory—3 hours. Prerequisite: course 105; optional outdoor weekend
field trip. Prerequisite: course 120 may be taken concurrently;
consent of instructor. Study of prokaryotic microorganisms from certain habitats. One half of lab-
atory effort will consist of organized experiments on
ecologically important microbial activities. For remain-
ing one-half, research projects will be done on student
selected specific habitats of microorganisms. Limited
credit for biology majors.
130A. Bacterial Physiology and Genetics (3) II. Igo
Lecture—3 hours. Prerequisite: course 102; Biological Sciences
103 (may be taken concurrently); Mathemat-
ics 16A. Physiology and regulation of bacterial
growth including the effect of the environment. Map-
ning techniques and use of mutants in protein solv-
ing.
130B. Bacterial Physiology and Genetics (3) II. Igo
Lecture—3 hours. Prerequisite: course 130A. Gene
regulation, Protein Metabolism, growth and
function of the bacterial cell envelope; synthesis
of peptidoglycan and lipopolysaccharide; active
transport of nutrients; chemotaxis.
130L. Bacterial Physiology Laboratory (3) II. Igo
Lecture—3 hours. Prerequisite: course 130 and
course 102. Physiology and genetics of bacteria and
bacterial viruses. Isolation and characterization of
mutant strains. Mapping of mutations by conjuga-
tion and transduction. Control of enzyme syn-
thesis by induction, repression and catabolic repres-
sion.
162. General Virology (4) I. Manning
Lecture—4 hours. Prerequisite: Biological Sciences
1A, 102: Integrated presentation of the nature of ani-
mal, bacterial, and plant viruses, including their struc-
ture, replication and genetics.
177. Metabolism of An aerobic Bacteria (3) II. Macy
Animal Science
Lecture—3 hours. Prerequisite: course 102; Biological Sciences
103 (may be taken concurrently). Various
groups of anaerobic and facultatively anaerobic bac-
teria, 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. Macy (Animal Science)
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 char-
acteristic 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/conference—1 hour. Prerequisite: upper
division standing; consent of instructor. Presentation
and discussion of student research activities;
designated for advanced undergraduate students. May
be repeated for a maximum of 3 units of credit when
subject matter differs. (P/NP grading only)
192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Technical and/or professional
experience on or off campus. Supervised by a mem-
ber 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 individual microbiological research
project culminating in the preparation of a senior thesis and
under a faculty director. (P/NP grading only)
197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff
Lecture—1-5 hours. Prerequisite: course 192 and
subsequent microbiology courses. Consent of
chairperson. Assist in undergraduate laboratory
courses supervised by teaching assistants or faculty;
in discussion sections supervised by faculty; and
classroom "drop-in" offices for individual help. (P/NP grading only)
198. Directed Group Study (1-5) I, II, III. The Staff
Lecture—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only)
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Lecture—1-5 hours. 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 (Chair-
person in charge)
Lecture—3 hours. Prerequisite: first-year graduate
standing with interest in microbiology. A survey of
general microbiology at the graduate level.
210. Molecular Mechanisms in Microbial Patho-
genesis (3) II. Manning, Hirsh (Veterinary Microbi-
ology 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 mol-
icular mechanisms involved in pathogenesis of
higher eukaryotic organisms. Emphasis on the
alteration or inhibition of cellular metabolism and function
by bacteria and animal viruses.
215. Recombinant DNA (2) I. Pravatka
Lecture—2 hours. Prerequisite: courses 190A-130B or
Biological Sciences 101, 102 and 103. Application of the recombinant DNA technology to modern
problems in biology, biochemistry and genetics, empha-
sizing molecular cloning strategies, choice of vectors,
preparation of insert DNA and selection procedures.
215L. Recombinant DNA Laboratory (4) I. Pravatka
Lecture/discussion—10 hours. Prerequisite: course
130L or Molecular and Cellular Biology 120L;
Biological Sciences 101, consent of instructor. Ap-
plication of the recombinant DNA technology to mod-
ern problems in biology, biochemistry and genetics,
emphasizing molecular cloning strategies, choice of vectors,
preparation of insert DNA and selection pro-
cedures. Submit applications, available from Microbi-
ology Section Office, two weeks prior to first day of class.
240. Biology of Autotrophic Prokaryotes (3)
I. Weis, G. Wheels
Lecture/discussion—3 hours. Prerequisite: Biological
Sciences 103. Biochemistry and ecology of pho-
totrophic and chemoheterotrophic bacteria, and of
methylo trophic bacteria, with special emphasis on the mechanisms of
ATP and respiratory generation. Offered in alternate years.
250. Biology of Yeasts (5) I. Bisson (Viticulture and
Enology), C. Price (Food Science and Technology)
Lecture—3 hours; laboratory—2 hours. Prerequisite:
consent of instructor. Survey of the genetics, physiol-
ogy, regulatory mechanisms, structure, ecology and
diversity of yeasts and related organisms. Offered
in alternate years.
260. Bacterial Genetic Regulatory Mechanisms (3)
I. Arzt
Lecture/discussion—3 hours. Prerequisite: general
knowledge of nucleic acid biochemistry and bac-
terial 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 termi-
nation; translational controls; tRNA modification effects; autoregulation on bacterial viruses; supercontrol. Offered in alternate years.
226. Advanced General and Molecular Virology (3) III. Manning, Luciw (Medical Pathology), Bruening (Pathology). Lecture—3 hours. Prerequisite: graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression, replication, and effects on host cells and organisms.

227. Advanced Animal Virology (3) III. Manning, Privalsky
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.

290C. Advanced Research Conference (1), I, II, III. The Staff (Chairperson in charge)
Discussion/conferences—1 hour. Prerequisite: graduate standing and 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 Bacteriology (1), I, II.
The Staff (Chairperson in charge)
Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (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 virology with presentations by individual students. (S/U grading only.)

293. Seminar in Protein Sorting (1), I. Klionsky
Seminar—1 hour. Prerequisite: consent of instructor. Reading, presentation, and discussion of current research papers on the topics of organelle biogenesis, protein sorting and secretion. (S/U grading only.)

296. Seminar in Animal Virology (1) I. Manning
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (Same course as Veterinary Microbiology 292.) (S/U grading only.)

297. 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.)

Biological Sciences: Molecular and Cellular Biology
Mark G. McNamara, Ph.D., Chairperson of the Section
Section Office, 149 Briggs Hall (916-752-3611)

Faculty
Primary Section Members
Peter B. Armstrong, Ph.D., Professor
Ronald J. Baskin, Ph.D., Professor
Hilary P. Benton, Ph.D., Adjunct Assistant Professor
James B. Boyd, Ph.D., Professor
Kenneth C. Burlington, Ph.D., Assistant Professor
Judy Callis, Ph.D., Assistant Professor
Don M. Carlson, Ph.D., Professor
Wallis H. Clark, Jr., Ph.D., Professor (Animal Science)
James S. Clegg, Ph.D., Professor
Richard S. Criddel, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Michael E. Decker, Ph.D., Professor
David W. Deemer, Ph.D., Professor
Roy H. Ditt, Ph.D., Professor
Carol A. Erickson, Ph.D., Professor
Maryann M. Gass, Ph.D., Professor
Charles S. Gasser, Ph.D., Associate Professor
Robert D. Grey, Ph.D., Professor, Academic Senate Distinguished Teaching Award

R. Scott Hawley, Ph.D., Professor
Jery L. Hedrick, Ph.D., Professor
Leonard M. Doll, Jr., Ph.D., Associate Professor (Biological Chemistry)
William R. Jeffery, Ph.D., Professor
John A. Kiger, Ph.D., Professor
J. Clark Langan, Ph.D., Professor
R. Marc Learned, Ph.D., Assistant Professor
Roger J. Leslie, Ph.D., Professor
Mark G. McNamee, Ph.D., Professor
Gregg G. Moran, Ph.D., Associate Professor
Jeanette E. Naito, Ph.D., Assistant Professor
Richard L. Nuccilli, Ph.D., Professor
Raymond L. Rodriquez, Ph.D., Professor
Carl W. Schmid, Professor (Chemistry)
Jonathan M. Scholey, Ph.D., Associate Professor
Irwin H. Scigel, Ph.D., Professor
Che-Kun J. Shen, Ph.D., Professor
Larry R. Sprengman, Ph.D., Lecturer

Section Second Members
Ernest S. Chang, Ph.D., Professor (Animal Science)
Richard H. Fark, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
John J. Harada, Ph.D., Associate Professor
Daniel J. Klionsky, Ph.D., Assistant Professor
Stephen C. Kowalik, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Brian Mullen, Ph.D., Professor
Sharon O'Neill, Ph.D., Assistant Professor
Pamela A. Papoian, Ph.D., Associate Professor
Martin L. Privalsky, Ph.D., Professor
Steven M. Teg, Ph.D., Assistant 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
Paul A. Castelfranco, Ph.D., Professor Emeritus
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
Gordon J. Edlin, Ph.D., Professor Emeritus
Melvin M. Green, Ph.D., Professor Emeritus
Paul K. Stumpf, Ph.D., Professor Emeritus

Courses in Molecular and Cellular Biology (MCB)

Lower Division Courses
10. Introduction to Human Heredity (4) I. Sanders; II. Hawley
Lecture—3 hours; discussion—1 hour. Topics in human heredity and human genetics and structure and function, including the genetics of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development and behavior. Not open to students who have received credit for Genetics 10. ( Former course Genetics 10.) General Education credit: nature and Environment.
99. Special Study (1-5) I, II, III. The Staff (Chairperson in charge)
Independent study—3-15 hours. Prerequisite: consent of instructor. Directed research study for undergraduate students. (Former course Genetics 99.) (P/NP grading only.)

Upper Division Courses
120L. Biochemistry Laboratory (6) I. Doi, Hilt, Sprecher, III. Hilt, Segel, Carlson, Hedrick, III, Criddel, Dahrus, Hilt, Sprecher Laboratory—10 hours; lecture—2 hours; laboratory study—4 hours. 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 part of their major studies. Not open to students who have received credit for Biochemistry and Biophysics 101L. ( Former course Biochemistry and Biophysics 101L.)

121. Molecular Biology of Eukaryotic Cells (3) II. Dahmus
Lecture—3 hours. Prerequisite: Biological Sciences 103 and course 120L. Structure, expression and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription and RNA processing; protein synthesis and regulation; development, immune system and oncogenes. Not open to students who have received credit for Biochemistry and Biophysics 153. ( Former course Biochemistry and Biophysics 153.)

123. Structure and Function of Proteins (3) I. Criddel, Hedrick
Lecture—3 hours. Prerequisite: course 120L. Biological Sciences 103. Correlation of structure and biological function. Molecular models of enzymes that should link their physical functioning. Physical and chemical methods used in determining protein structure. Function as measured by kinetic and binding models and as affected by physiological considerations. Not open to students who have received credit for Biochemistry and Biophysics 143. ( Former course Biochemistry and Biophysics 143.)

125. Behavior and Analysis of Enzyme Systems (3) III. Segel
Lecture—3 hours. Prerequisite: Biological Sciences 103. Introduction to enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include steady-state kinetics, patterns of feedback inhibition, control by enzyme activity, allosteric enzymes, multireceptor systems, enzyme assays, and membrane transport. Not open to students who have received credit for Biochemistry and Biophysics 145. ( Former course Biochemistry and Biophysics 145.)

126. Plant Biochemistry (3) III. Callis
Lecture—3 hours. Prerequisite: Biological Sciences 103. The chemistry of important plant processes and development in photosynthesis and respiration; carboxylate, fat and nitrogen metabolism. Not open to students who have received credit for Biochemistry and Biophysics 122. ( Former course Biochemistry and Biophysics 122.)

138. Undergraduate Seminar in Biochemistry (1) I. Carlson; II. Criddel, III. Gasson
Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. ( Former course Biochemistry and Biophysics 190.) (P/NP grading only.)

140L. Cell Biology Laboratory (3) III. Leslie
Lecture—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 103, 104; course 141 recommended. Exercises illustrate the principles of cell biology, emphasis on individual research employing one or more advanced techniques. Not open to students who have received credit for Zoology 121L. ( Former course Zoology 121L.)

141. Cellular Regulation of Gene Expression (4) II. Naito
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 to students who have received credit for Zoology 121B. ( Former course Zoology 121B.)

142. Advanced Cell Biology Contract and Mobile Systems (4) III. Baskin, Schnick
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 104; Mathematics 16B. Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile systems. Not open to students who have received credit for Zoology 121C. ( Former course Zoology 121C.)

146. Histology (4) II. Benton
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Sciences 104. Function and survival of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms
underlying physiological and metabolic processes. Not open to students who have received credit for Zoology 202. (Former course Zoology 200.)

148. Undergraduate Seminar in Cell Biology (2) I. Erickson, II, III. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Students prepare and present seminars on 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. Laboratory in Vertebrate Embryology (1) I. Armstrong, II, III. The Staff
Laboratory—3 hours. Prerequisite: concurrent enrollment in course 150. The comparative analysis of the embryonic development of vertebrates. Not open to students who have received credit for Zoology 100L. (Former course Zoology 100L.) (P/NP grading only.)

151. Advanced Developmental Biology (4) II. Erickson, Naszle, Jeffery, Nuccitelli
Lecture—4 hours; laboratory—2 hours; written report.
Prerequisite: courses 150, 150L. Biology Sciences 103. Lectures in modern topics in developmental biology will be followed by sophisticated laboratory exercises that demonstrate lecture topics. Students conduct their own independent studies during last four weeks of quarter; written report due at end of the quarter. Not open to students who have received credit for Zoology 101. (Former course Zoology 101.)

158. Undergraduate Seminar in Developmental Biology (2) I, II. Erickson, Naszle. III. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in developmental 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) I. Gruy
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. (Former course Zoology 102.)

160. Principles of Genetics Laboratory (2) I. Boyd, Birula, Kiger, II. Boyd, Rodriguez, Sanders
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biology Sciences 101. Laboratory work in basic genetics including gene mapping and isolation of mutants. Not open to students who have received credit for Genetics 100L. (Former course Genetics 100L.)

161. Molecular Genetics (3) III. Rodriguez
Lecture—3 hours. Prerequisite: Biology Sciences 103. Molecular genetics including DNA structure and replication, restriction analysis, sequencing, transcription, translation and gene regulation. Not open to students who have received credit for Genetics 102A and 102B. (Former courses Genetics 102A and 102B.)

162. Human Genetics (3) III. Sanders
Lecture—3 hours. Prerequisite: Biology Sciences 101 or the equivalent. Human molecular genetic variation, metabolic and genetic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects. Not open to students who have received credit for Genetics 107. (Former course Genetics 107.)

163. Developmental Genetics (3) II. Birula
Lecture—3 hours. Prerequisite: Biology Sciences 101; Biology Sciences 102 and 103; consent of instructor. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. Not open to students who have received credit for Genetics 104. (Former course Genetics 104.)

164. Chromosome Structure and Function (3) I. Hawley
Lecture—3 hours. Prerequisite: Biology Sciences 101; course 150L. A study of the structure and function of chromosomes and the role in cell division and gene expression.

165. Advanced Developmental Genetics (3) II. 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 Drospheila and Caenorhabditis with emphasis on transgenic and other novel techniques for the description and manipulation of developmental processes. Not open to students who have received credit for Genetics 144. (Former course Genetics 144.) (P/NP grading only.)

170. Advanced Molecular Genetics Laboratory (4) II. Learned; III. Morin
Lecture—9 hours; laboratory—1 hour. Prerequisite: Biology Sciences 103; courses 121, 141, or 161 and consent of instructor; laboratory experience; Microbiology 102L recommended. Molecular analysis of gene structure and function. Isolation, manipulation and characterization of DNA, RNA, and proteins using recombinant DNA technology. Limited enrollment. Not open to students who have received credit for Genetics 102L. (Former course Genetics 102L.)

178. Undergraduate Seminar in Molecular Genetics (1) I. Hawley; II. Schmid; III. Sanders
Seminar—1 hour. Prerequisite: upper division standing, completion of Biology 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. (Former course Genetics 191C.)

190C. Undergraduate Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor; and concurrent enrollment in research program. Discussion of current research by faculty and students. May be repeated for credit. (Former course Genetics 190C.) (P/NP grading only.)

191. Introduction to Research (1) I, II, III. Segel
Seminar—1 hour. Prerequisite: 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. (P/NP grading only.)

192. Internship (1-2) 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. (Former courses Biochemistry and Biophysics 192, Genetics 192.) (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 direction 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. (Former course Genetics 193.) (P/NP grading only.)

194H. Research Honors (3) I, II, III. The Staff
Independent study—9 hours. Prerequisite: 6 units of course 193 with faculty director; senior standing; grade point average of at least 3.25, and 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 thesis and in a seminar. (Former course Biochemistry and Biophysics 194H.) (P/NP grading only.)

197T. Tutoring (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: upper division standing, completion of course 202, and consent of instructor. To assist the instructor by tutoring students in one of the Section's regular courses. (Former course Biochemistry and Biophysics 197T, Genetics 197T.) (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Variable—1-5 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 198, Genetics 198.) (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. (Former course Biochemistry and Biophysics 199, Genetics 199.) (P/NP grading only.)

Graduate Courses

200A. Current Techniques in Cell Biology (3) I. The Staff
Lecture—2 hours. Prerequisite: graduate standing; Biology Sciences 104 and course 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophoresis, immunohistochemistry, 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 techniques. Same course as Cell and Developmental Biology 200. (SU grading only.)

200B. Current Techniques in Biochemistry (2) I. Hedrick
Lecture—2 hours. Prerequisite: Biology Sciences 102 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. Not open to students who have received credit for Biochemistry and Biophysics 200. (Former course Biochemistry and Biophysics 200.)

200C. Current Techniques in Biophysics (3) I. The Staff
Lecture—2 hours. Prerequisite: graduate standing; Biology Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffusion, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophotology. Same course as Biophysics Graduate Group 200. (SU grading only.)

220L. Advanced Biochemistry Laboratory Rotations (5) I, II, III. Hedrick
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 methodology, procedural experience and experimental design. May be repeated twice for credit. (Former course Biochemistry and Biophysics 220L.)

221A. Physical and Chemical Biochemistry (4) I. Segel
Lecture—4 hours. Prerequisite: Biology Sciences 103, Chemistry 107B-108 or 110C, 128C-129C or 118C, or the equivalent courses. Biochemical thermodynamics and chemical and physical properties of biopolymers and macromolecules, including enzyme kinetics and methods for determination of size and shape of macromolecules. Not open to students who have received credit for Biochemistry and Biophysics 221L. (Former course Biochemistry and Biophysics 221A.)

221B. Integration of Metabolism and Regulatory Phenomena (3) III. Learned, Segel

*Course not offered this academic year.*
Presentation and critique of recent journal articles in cell biology. General topuc area will change each quarter. May be repeated for credit. (Former course Zoology 242.) (SU grading only.)

**250. Special Topics in Cell Biology** (3) I. Deamer
Lecture—2 hours. Discussion—1 hour. Prerequisite: course 211A or consent of instructor. Discussion and review of current topics in cell biology. May be repeated for credit. (Former course Zoology 240.)

**251. Biology of Fertilization** (3) I. Nuccitelli, Meisel, Clark, Hedrick
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 104 or the equivalent, and consent of instructor. The morphology, physiologic and biochemical processes associated with fertilization and the mechanism of development will be discussed. Offered in alternate years. Not open to students who have received credit for Zoology 225. (Former course Zoology 225.)

**252. Cellular Basis of Morphogenesis** (4) III. Armstrong
Lecture/discussion—3 hours; term paper. Prerequisite: course 150. Development of form and structure: morphogenetic mechanisms, morphogenetic movements, mechanisms of cellular motility, cell adhesion, intercellular interaction, and differentiation. Offered in alternate years. Not open to students who have received credit for Zoology 205. (Former course Zoology 204.)

**253. Pattern Formation** (4) I. Nuccitelli
Lecture—3 hours; term paper. Prerequisite: course 150, Biological Science 104 or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with epidermal segmentation. Emphasis will be on cell polarity, but some multifactorial systems will also be considered. Offered in alternate years. Not open to students who have received credit for Zoology 205. (Former course Zoology 205.)

**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 differentiated to form a functional unit, using five selected organism systems. Not open to students who have received credit for Zoology 206. (Former course Zoology 206.)

**255. Molecular Mechanisms in Animal Development** (3) Platek
Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: graduate standing or consent of instructor; introduction to background in development 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, chickens, and mice will be discussed. Readings will be taken from current literature. Offered in alternate years. Not open to students who have received credit for Zoology 230. (Former course Zoology 201.)

**256. Cell and Molecular Biology of Cancer** (1) I. Armstrong
Lecture—1 hour. Prerequisite: course '150 or 141 or Biological Sciences 104 or Biological Sciences 102 and 200. Analysis at the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, and characterization and determination of oncogenic and anti-oncogenic agents. Not open to students who have received credit for Zoology 226. (Former course Zoology 226.)

**257. Seminar in Development** (2) I. Armstrong
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion of reports on topics, morphogenesis, and development. May be repeated for credit. (Former course Zoology 292.) (SU grading only.)

**258. Literature in Developmental Biology** (1) I. Armstrong
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (Former course Zoology 293.) (SU grading only.)

**259. Confronting DNA and Genetic Engineering** (3) I. 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, transcription, DNA transformation, and other genetic aspects. Prerequisites will be considered in alternate years. Not open to students who have received credit for Genetics 202. (Former course Genetics 202.) (SU grading only.)

**290C. Research Conference** I, II, III. The Staff
Seminar—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. (Former course Biochemistry and Biophysics 250 and Genetics 290C.) (SU grading only.)

**291. Current Progress in Molecular and Cellular Biology** I, II, III. The Staff
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. (Former course Biochemistry and Biophysics 291.) (SU grading only.)

**295. Literature in Molecular and Cellular Biology** I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology. essays on various topics. May be repeated for credit. (Former course Biochemistry and Biophysics 295.) (SU grading only.)

**296. Research Seminar** I, II, III. The Staff
Seminar—1 hour. Prerequisite: course 221C or consent of instructor. Presentations 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. (Former course Biochemistry and Biophysics 296.) (SU grading only.)

**296. Group Study (1-5) I, II, III. The Staff
Variable—1-5 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 296 and Genetics 296) (SU grading only.)

**299. Research (1-12) I, II, III. The Staff
Independent study—3-36 hours. (Former courses Biochemistry and Biophysics 299 and Genetics 299.) (SU grading only.)

Professional Course

**390. Methods of Teaching** I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and principles of teaching biochemistry and genetics/cell biology. Includes analysis of text and supporting material, discussion of teaching techniques, techniques for conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for credit. (Former courses Biochemistry and Biophysics 390 and Genetics 300.) (SU grading only.)

---

**Biological Sciences: Neurobiology, Physiology, and Behavior**

Barbara A. Horwitz, Ph.D., Chairperson of the Section

Section Office, 196 Briggs Hall (916-752-0203)
Faculty
Primary Section Members
Maryynn S. Barkley, Ph.D., Associate Professor
Earl D. Carstens, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor (Animal Science)
Charles A. Fuller, Ph.D., Professor
Jack M. Goldberg, Ph.D., Lecturer
John M. Horowitz, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Barbara A. Horowitz, Ph.D., Professor, Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarship
Andrew T. Ishida, Ph.D., Associate Professor
Patricia Johnson, Ph.D., Adjunct Professor (Nutrition)
Peter R. Marier, Ph.D., Professor
Gary F. Moberg, Ph.D., Professor (Animal Science)
Brian Mullaney, Ph.D., Professor
Pamela A. Pappone, Ph.D., Associate Professor
Grace L. Rosengren, Ph.D., Assistant Adjunct Professor
Arnold J. Silman, Ph.D., Professor
W. Jeff Weidner, Ph.D., Professor
Martin Wilson, Ph.D., Professor
Charles M. Winget, Ph.D., Lecturer
Dorothy W. Wooley, Ph.D., Professor
Secondary Section Members
Ronald J. Baskin, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Marc Mangel, Ph.D., Professor
Mark G. McNaught, 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
Frederick W. Lorenz, Ph.D., Professor Emeritus
Verne E. Mordo, Ph.D., Professor Emeritus
Arthur H. Smith, Ph.D., Professor Emeritus

Courses in Neurobiology, Physiology and Behavior (NPB)

Lower Division Course
101. Elementary Physiology (4) III. The Staff Lecture—3 hours; discussion—1 hour. Introductory course in physiology for nonscience majors. Not open for credit to students who have had Biological Sciences 1B.

Upper Division Courses
108B. Cellular Physiology (3) II. Horowitz Lecture—3 hours. Prerequisite: Physiology 100A or Biological Sciences 104; Physics SC recommended. Continuation of course 100A, with emphasis on transport processes, generation and communication of information between the environment and cells and between cells. Cellular aspects and immune-system functions.

108L. Cellular Physiology Laboratory (2) II. Horowitz Horowitz—5 hour sessions to alternate weekly with discussion—2 hour sessions. Prerequisite: Biological Sciences 104, course 108B (may be taken concurrently), or consent of instructor. Experiments in the physical and chemical processes of cells and tissues.

106. Experiments in Physiology: Design and Execution (3) I, II, III. The Staff Laboratory—7 to 9 hours; discussion—0.5 hours. Prerequisite: course 110 and consent of instructor. Experiments in current physiological problems. Discussion of experimental design. Students choose a project, and independently or in groups of 2-3, design an protocol, do the project, and report their findings. May be repeated for credit with consent of instructor. (P/NP grading only.)

110L. Systemic Physiology Laboratory (2) I. Adamsen; III. Ishida Laboratory—3 hours; discussion—1 hour. Prerequisite: course 110 prior to taking 110L recommended, but may be taken concurrently. Selected experiments to illustrate functional characteristics of organs systems discussed in course 110.

111A. Advanced Systemic Physiology Laboratory (3) I. Adamsen Laboratory—1 hour; discussion—5/2 hour sessions to alternate weekly with laboratory—5 hour sessions. Prerequisites: courses 110, 110L, courses 113, 114 recommended. Selected comprehensive experiments on the cardiovascular, respiratory, digestive, endocrine, and circulatory systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

111B. Advanced Systemic Physiology Laboratory (3) II. Adamsen Laboratory—1 hour; discussion—5 hour sessions to alternate weekly with laboratory—5 hour sessions. Prerequisite: courses 110, 110L, Statistics 13; course 112 recommended. Course 111A is not a prerequisite for course 111B. Selected comprehensive experiments on the nervous and muscular systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

112C. Advanced Systemic Physiology Laboratory (3) III. Adamsen Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110, 110L, Statistics 13; course 112 recommended. Interfacing physiological recording equipment with microcomputers; data acquisition and analysis using microcomputers; data interpretation within the framework of physiological concepts.

112. Neurosciences (3) I. Carstens, Horowitz Lecture—3 hours. Prerequisite: course 110. Advanced presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration.

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg, Weidner Lecture—4 hours, prerequisite: course 110; Chemistry 6B, Physics SB recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students, graduate students, and others in allied interests.

114. Gastrointestinal Physiology (3) III. Johnson Johnson—3 hours; term paper. Prerequisite: course 110; Biological Sciences 103 recommended. Advanced gastrointestinal physiology covering absorption, secretion, and digestion, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastrointestinal tract; some pathology and nutritional items will be covered.

117. Avian Physiology (3) II. The Staff Lecture—3 hours. Prerequisite: course 110 or Biological Sciences 1B. Physiology of the various systems of birds with an emphasis on digestion, respiration, excretion, and endocrine systems.

120A. Comparative Physiology: Neurointegrative Mechanisms (3) III. Wooley Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

120B. Comparative Physiology: Circulation (3) III. Goldberg Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.

120D. Comparative Physiology: Endocrinology (3) III. Barker Lecture—3 hours. Prerequisite: course 110. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.

120E. Comparative Physiology: Respiration (3) III. Coch Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: respiration. Offered in alternate years.

120F. Comparative Physiology of Sensory Systems (3) III. Sillman Lecture—3 hours. Prerequisite: course 110. Basic physiological and cellular mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photoreceptive systems (vision, infrared detection, UV detection), electrosensory systems, and pain. Emphasis on receptors.

121. Physiology of Reproduction (3) II. Anderson Lecture—3 hours. Prerequisite: course 110. Physiological mechanisms involved in species 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. (PINP grading only.)

130. Physiology of the Endocrine Glands (4) I. Moberg Lecture—4 hours. Prerequisite: course 110. Advanced presentation of concepts in endocrinology with emphasis on roles of hormones in reproduction, metabolism, and development.

142. Invertebrate Physiology (4) II. Crowe Lecture—3 hours; term paper; individual conferences. Prerequisite: Evolution and Ecology 112, Chemistry 2A, 2B, Physics SC; Biological Sciences 102 and 103 recommended. Comparative physiology of invertebrate organ systems. Former course Zoology 142.

142L. Invertebrate Physiology Laboratory (3) II. Crowe Laboratory—6 hours (includes research project). Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project. Former course Zoology 142L.

143. Neurobiology (4) I. Mulleney, Wilson Lecture—3 hours, extensive reading. Prerequisite: Biological Sciences 1A, 1B, or Biological Sciences 102 and 103, or the equivalent. Neuronal structure; impulse transmission; synapses; neurotransmitter and transmitter pharmacology; receptors; growth and differentiation of neurons and nervous systems; genetics of behavior. Former course Zoology 143.

143L. Neurobiology Laboratory (4) I. Mulleney Laboratory—12 hours. Prerequisite: a course in neurobiology or neurophysiology, i.e., course 110, 112, 120F, or course 115. Physics SC recommended. Students will learn to record neural activity, to interpret their recordings, and to label neurons with antibodies against neurotransmitters. Former course Zoology 143L.

148. Principles of Environmental Physiology (3) II. Fuller Lecture—3 hours. Prerequisite: course 110 and Biological Sciences 104, or Biological Sciences 102 or the equivalent. Physiological aspects of interactions of organisms and environment at cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure and osmotic environmental variables.

155. Behavior of Animals (5) I. Stamp Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Biological Sciences 1A, 1B. Basic principles, mechanisms and evolution of behavior, with special reference to the significance of behavior under natural conditions. Students who have had Animal Science 104 may receive only 4 units of credit for this course. Former course Zoology 155.

190. Proseminar in Physiology (3) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours. Prerequisite: course 110 and Biological Sciences 104 (or Physiology 100A), one additional upper division course in physiology or a related course not offered this academic year.
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 sciences; 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 (PNP 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. (PNP grading only.)

194HA-194HB-194HC. Physiology—Honors (1, 1-4, 2) I, II, III. The Staff Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.5 GPA; approval by the section's Honors Committee. Honors project in physiology. Laboratory research in physiology on a specific topic. Project developed with a sponsoring faculty member (Physiology Graduate Group member) and approved by the section's Honors Committee. Honors thesis submitted upon completion of the project. (PNP grading only.)

196A. Voluntary Control of Physiological Processes (2) I, II, III. Lorenz Seminar—2 hours. Prerequisite: upper division standing 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. (PNP grading only.)

196B. Voluntary Control of Physiological Processes (2) 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. (PNP grading only.)

197T. Tutoring in Neurobiology, Physiology and Behavior (1-5) I, II, III. The Staff Discussion—1-5 hours. Prerequisite: upper division standing and consent of instructor. Assisting in courses in neurobiology, physiology and behavior under the direction of the faculty. (PNP grading only.)

198. Directed Group Study (1-6) 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. (PNP grading only.)

99. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) PNP grading only.

Courses in Plant Biology (PLB) (Formerly courses in Botany.)

Lower Division Courses

18. Plants, People and the Biosphere (3) I, II. 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. Non-science majors are encouraged to enroll. General Education credit: Nature and Environment.

19. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Primarily for lower division students. (PNP grading only.)

Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) PNP grading only.

Upper Division Courses

*101. Survey of Plant Communities of California (4) I, II. Barbour Lecture—2 hours; fieldwork—1 hour; term paper. Prerequisite: consent of instructor required; Biological Sciences 1C recommended. Structure of selected plant communities and the relationship of their component species to environmental resources. Recommended for non-majors. General Education credit: Nature and Environment.

102. California Floristics (5) III. The Staff 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 wild 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.

*Course not offered this academic year.
119. Introductory Mycology (5) I. The Staff
Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to the isolation, identification, and taxonomy of selected species of the major divisions of the fungi.

120. Introduction to Weed Science (3) II. Bayer
Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 6A, 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. The identification of common weeds and demonstrations to illustrate the principles.

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.

122. Action of Herbicides (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120; Soil Science 105; courses 111, 112 recommended.立项 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 factors in herbicides.

125. Molecular Biology of Plant Development (3) III. Murphy
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Biological Sciences 105, Molecular and Cellular Biology 154 or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues.

135. Mineral Nutrition of Plants (4) III. J. Richards
(Land, Air and Water Resources) and 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 ecologic aspects of plant nutrition. (Same course as Plant Science 135.)

150. Biology and Management of Freshwater Macrophytes (3) I. Jacobi
Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 6B; course 111 or Water Science 122 recommended. Brief survey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (meromorphosis, interactions), ecology and management. Offered in alternate years.

155. Anatomical and Cytological Methods (4) III. The Staff
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Practical laboratory methods in preparing biological material for examination with the light microscope; special emphasis given to localization of cell constituents; introduction to photomicrography and autoradiography.

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 course in plant sciences, and consent of the instructor. Provides an opportunity for upperclass biology majors to formulate research proposals and carry out their own experiments. (P/N 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/N 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/N grading only.)

194I. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open only to major 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/N grading only.)

1977. 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/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
(Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

Concordance Table for Biological Sciences appears on the next page

Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group (916-752-1135 or 752-2543)
Group Office, 3078 Bainer Hall (Chemical Engineering), 916-559-2059
Faculty includes faculty members from the three colleges, and the Schools of Medicine and 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 are intended to 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. It is a broad interdepartmental program which is best suited for students who are capable and comfortable with considerable independence. Each student together with an advisor 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 applicants. Some such training can in principle be acquired after admission to the Group, but it generally necessitates one or more additional years of study.

Faculty Advisers. F.E. Curry (Human Physiology); N. Hubbard (Mechanical Engineering); M.L. Hull (Mechanical Engineering); D. Katz (Obstetrics and Gynecology, Chemical Engineering); R.B. Martin (Orthopaedic Surgery); J.F. Stuckelberg (Materials Science Engineering); R. Smith (Electrical and Computer Science Engineering).

Courses in Biomedical Engineering (BIM) Graduate Courses

200. Introduction to Biomedical Engineering (4) I. Katz
Lecture—4 hours. Introduction to application of and interaction between engineering technology and the biological and medical sciences and demonstration of some clinical applications.

210. Introduction to Biomechanics (4) I. 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 orthopedic and cardiovascular materials.

225. Spatial Kinematics and Robotics (3) II. Yang
Lecture—3 hours. Prerequisite: Mechanical Engineering 222. Spatial kinematics: Pears and line coordinates; basic methods of coordinate screw systems and instantaneous invariants for rigid body motion. Robotics: Solving for kinehematic equations; differential relationships, motion trajectories, application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years.

227. Research Techniques in Biomechanics (3) II. Williams
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Physical Education 115 recommended. Experience techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force plate analysis, strength assessment, planar and three-dimensional cinematography, data reduction and smoothing, body segment parameter determination; electromyography; biomechanical modeling. (Same as Physical Education 227.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull
Lecture—3 hours. Prerequisite: Engineering 102B. Mechanical Engineering 176. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimenental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years.

232. Orthopaedic Biomechanics (3) III. Martin
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to the biomechanics of the skeleton. Analysis of muscle and musculoskeletal forces, overview of the mechanical properties of bone, bone growth, modeling, remodeling, and repair; bone structure composition, quantitative histomorphometry, and techniques of surgical repair. Offered in alternate years.

252. Advanced Information Systems (3) II. Waters
Lecture—2 hours; laboratory—2 hours. Prerequisite: experience in initial phases of data preparation, editing and sorting. Computer Science Engineering 186 or the equivalent; must be able to perform at graduate level. To increase, through examples, projects and discussions, understanding of the components of information systems, including hardware, software, economics and people, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems.

250C. Seminar (1) I, II, III. Katz
Seminar—1 hour. Seminar in biomedical engineering. (SU grading only.)

250B. Group Study (1-5) I, II, III. The Staff

299. Research (1-12) I, II, III, IV. The Staff
(SU grading only.)

*Course not offered this academic year.
Concordance Lists for Sections in the Division of Biological Sciences

On July 1, 1993, the faculty and teaching programs of the six departments in the Division of Biological Sciences at UC Davis were reorganized into five new sections: Evolution and Ecology (EVE); Microbiology (MIC); Molecular and Cellular Biology (MCB); Neurobiology, Physiology and Behavior (NPB); and Plant Biology (PLB). On the following pages are lists of courses formerly offered by the old departments, followed by their new names, numbers, and titles in the new sections, and lists of courses offered by the five new sections, followed by their former names, numbers, and titles. Duplicate credit cannot be earned for a course under the new numbering system if credit has been earned for the course it replaced; however, some exceptions are allowed. If you have questions about duplication of credit or about receiving credit for repeating courses, please consult the Undergraduate Academic Programs Office, Division of Biological Sciences, 66 Briggs Hall (916-752-0410).

**Old Departments**

### Old Number and Course Title

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>101A General Biochemistry</td>
<td>Biological Sciences 102  Structure and Function of Biomolecules</td>
</tr>
<tr>
<td>101B General Biochemistry</td>
<td>Biological Sciences 103  Bioenergetics and Metabolism</td>
</tr>
<tr>
<td>101L General Biochemistry Laboratory</td>
<td>Molecular &amp; Cellular Biol 120L  Biochemistry Laboratory</td>
</tr>
<tr>
<td>102L Advanced Undergraduate Laboratory</td>
<td>Molecular &amp; Cellular Biol 126  Plant Biochemistry</td>
</tr>
<tr>
<td>110L General Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>111L General Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>122 Plant Biochemistry</td>
<td>Molecular &amp; Cellular Biol 123  Behavior and Analysis of Enzyme Systems</td>
</tr>
<tr>
<td>123 An Introduction to Enzymology</td>
<td>Molecular &amp; Cellular Biol 122  Structure and Function of Proteins</td>
</tr>
<tr>
<td>123L Enzymology Laboratory</td>
<td>Molecular &amp; Cellular Biol 121  Molecular Biology of Eukaryotic Cells</td>
</tr>
<tr>
<td>133 Behavior and Analysis of Enzyme Systems</td>
<td>Molecular &amp; Cellular Biol 138  Undergraduate Seminar in Biochemistry</td>
</tr>
<tr>
<td>148 Structure-Function Relations of Proteins</td>
<td>Molecular &amp; Cellular Biol 192  Internship</td>
</tr>
<tr>
<td>153 Molecular Biology of Eukaryotic Cells</td>
<td>Molecular &amp; Cellular Biol 194H  Research Honors</td>
</tr>
<tr>
<td>190 Undergraduate Seminar in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 197T  Tutoring</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Molecular &amp; Cellular Biol 198  Directed Group Study</td>
</tr>
<tr>
<td>194H Biochemistry Honors</td>
<td>Molecular &amp; Cellular Biol 199  Special Study for Advanced Undergraduates</td>
</tr>
<tr>
<td>197T Tutoring in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 200B  Current Techniques in Biochemistry</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Molecular &amp; Cellular Biol 221A  Physical and Chemical Biochemistry</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Molecular &amp; Cellular Biol 221B  Integration of Metabolism and Regulatory Phenomena</td>
</tr>
<tr>
<td>200 Current Techniques in Biochemistry</td>
<td>Molecular &amp; Cellular Biol 221C  Molecular Biology</td>
</tr>
<tr>
<td>201A Physical and Chemical Biochemistry</td>
<td>Molecular &amp; Cellular Biol 221D  Cellular Biochemistry</td>
</tr>
<tr>
<td>201B Integration of Metabolism and Regulatory Phenomena</td>
<td>Molecular &amp; Cellular Biol 220L  Advanced Biochemistry Laboratory Rotations</td>
</tr>
<tr>
<td>201C Molecular Biology</td>
<td>Molecular &amp; Cellular Biol 231  Membrane Biochemistry</td>
</tr>
<tr>
<td>201D Cellular Biochemistry</td>
<td>Molecular &amp; Cellular Biol 232  Chemical Modifications of Proteins</td>
</tr>
<tr>
<td>202L Advanced Biochemistry Laboratory</td>
<td>Molecular &amp; Cellular Biol 290C  Research Conference</td>
</tr>
<tr>
<td>204 Gene Expression</td>
<td>Molecular &amp; Cellular Biol 296  Research Seminar</td>
</tr>
<tr>
<td>208 Membrane Biochemistry</td>
<td>Molecular &amp; Cellular Biol 291  Current Progress in Molecular and Cellular Biology</td>
</tr>
<tr>
<td>212 Chemical Modifications of Proteins</td>
<td>Molecular &amp; Cellular Biol 298  Group Study</td>
</tr>
<tr>
<td>215 Kinetics of Biological Systems</td>
<td>Molecular &amp; Cellular Biol 299  Research</td>
</tr>
<tr>
<td>250 Biochemical Literature</td>
<td>Molecular &amp; Cellular Biol 390  Methods of Teaching</td>
</tr>
<tr>
<td>270 Advanced Research Conference</td>
<td></td>
</tr>
<tr>
<td>291 Current Progress in Biochemistry</td>
<td></td>
</tr>
<tr>
<td>298 Group Study</td>
<td></td>
</tr>
<tr>
<td>299 Research</td>
<td></td>
</tr>
<tr>
<td>390 The Teaching of Biochemistry</td>
<td></td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
# Concordance List for Biological Sciences (BIS)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX, 1XX, 2XX, All undergraduates and graduate courses.</td>
<td>Biological Sciences XX, 1XX, 2XX</td>
</tr>
</tbody>
</table>

See course listing for new upper division common curriculum (Biological Sciences 101, 102, 103, 104).

# Concordance List for Botany (BOT)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX Lower division courses in Botany</td>
<td>Plant Biology XX</td>
</tr>
<tr>
<td>100 Evolutionary Biology of Plants</td>
<td>Evolution and Ecology 100</td>
</tr>
<tr>
<td>117 Plant Ecology</td>
<td>Evolution and Ecology 117/Plant Biology 117</td>
</tr>
<tr>
<td>130 Survey of Cell Biology — Last offering: Fall 1983</td>
<td>Biological Sciences 104 — Effective Spring 1994</td>
</tr>
<tr>
<td>140 Paleobotany</td>
<td>Evolution and Ecology 140</td>
</tr>
<tr>
<td>144 Plant Geography</td>
<td>Evolution and Ecology 144</td>
</tr>
<tr>
<td>1XX All other upper division Botany courses</td>
<td>Plant Biology 1XX</td>
</tr>
<tr>
<td>202 Plant Ecophysiology</td>
<td>Plant Biology (Grad) 210</td>
</tr>
<tr>
<td>203 Ecophysiological Methods</td>
<td>Plant Biology (Grad) 211</td>
</tr>
<tr>
<td>246 Paleobotany and Angiosperm Evolution</td>
<td>Evolution and Ecology 240</td>
</tr>
<tr>
<td>243 Palynology</td>
<td>Evolution and Ecology 243</td>
</tr>
<tr>
<td>2XX All other graduate Botany courses</td>
<td>Plant Biology (Grad) 2XX</td>
</tr>
<tr>
<td>390 The Teaching of Botany</td>
<td>Plant Biology 390</td>
</tr>
</tbody>
</table>

# Concordance List for Genetics (GEN)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Heredity and Evolution</td>
<td>Molecular &amp; Cellular Biol 10</td>
</tr>
<tr>
<td>99 Special Study for Undergraduates</td>
<td>Molecular &amp; Cellular Biol 99</td>
</tr>
<tr>
<td>100 Principles of Genetics</td>
<td>Biological Sciences 101</td>
</tr>
<tr>
<td>100L Principles of Genetics Laboratory</td>
<td>Molecular &amp; Cellular Biol 160L</td>
</tr>
<tr>
<td>102A Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 161</td>
</tr>
<tr>
<td>102B Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 170L</td>
</tr>
<tr>
<td>103 Organic Evolution</td>
<td>Evolution and Ecology 100</td>
</tr>
<tr>
<td>104 Developmental Genetics</td>
<td>Molecular &amp; Cellular Biol 153</td>
</tr>
<tr>
<td>105 Population Genetics</td>
<td>Evolution and Ecology 102</td>
</tr>
<tr>
<td>106 Evolutionary Quantitative Genetics</td>
<td>Evolution and Ecology 106</td>
</tr>
<tr>
<td>107 Human Genetics</td>
<td>Molecular &amp; Cellular Biol 162</td>
</tr>
<tr>
<td>144 Advanced Developmental Genetics</td>
<td>Molecular &amp; Cellular Biol 166</td>
</tr>
<tr>
<td>190C Introduction to Genetics Research</td>
<td>Molecular &amp; Cellular Biol 178</td>
</tr>
<tr>
<td>191 Undergraduate Seminar in Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 192</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Molecular &amp; Cellular Biol 193</td>
</tr>
<tr>
<td>193 Research Seminar in Current Topics</td>
<td>Molecular &amp; Cellular Biol 197</td>
</tr>
<tr>
<td>197T Tutoring in Genetics</td>
<td>Molecular &amp; Cellular Biol 196</td>
</tr>
<tr>
<td>198 Group Study</td>
<td>Molecular &amp; Cellular Biol 199</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Molecular &amp; Cellular Biol 262</td>
</tr>
<tr>
<td>202 Plasmids, Recombinant DNA, and Genetic Engineering</td>
<td>PopulationBiol (Grad) 203</td>
</tr>
<tr>
<td>205 Theoretical Population Genetics</td>
<td>PopulationBiol (Grad) 205</td>
</tr>
<tr>
<td>209 Molecular Evolution</td>
<td>PopulationBiol (Grad) 209</td>
</tr>
<tr>
<td>290C Research Conference in Genetics</td>
<td>Molecular &amp; Cellular Biol 290C</td>
</tr>
<tr>
<td>298 Group Study</td>
<td>Molecular &amp; Cellular Biol 298</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.
## Concordance List for Genetics (GEN) continued

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>299 Research</td>
<td>Molecular &amp; Cellular Biol 299 Research</td>
</tr>
<tr>
<td>300 Methods in Teaching Genetics</td>
<td>Molecular &amp; Cellular Biol 390 Methods of Teaching</td>
</tr>
</tbody>
</table>

## Concordance List for Microbiology (MIC)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX, 1XX, 2XX, All undergraduate and graduate courses.</td>
<td>Microbiology XX, 1XX, 2XX No change to existing courses or numbers.</td>
</tr>
</tbody>
</table>

## Concordance List for Physiology—Animal (PHS)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 2L Introductory Physiology</td>
<td>Biological Sciences 104 Regulation of Cell Function</td>
</tr>
<tr>
<td>10 Elementary Physiology</td>
<td>NeuroPhysiol&amp;Behavior 106 Experiments in Physiology: Design and Execution</td>
</tr>
<tr>
<td>100A Cellular Physiology — Last Offering: Fall 1993</td>
<td>NeuroPhysiol&amp;Behavior 1XX Undergraduate courses in Neurobiology, Physiology and Behavior</td>
</tr>
<tr>
<td>106A Experiments in Physiology: Design and Execution</td>
<td>Physiology (Grad) 2XX Graduate courses in the Physiology Graduate Group</td>
</tr>
<tr>
<td>147 Aviation Physiology</td>
<td>Physiology (Grad) 3XX Professional courses in the Physiology Graduate Grp</td>
</tr>
<tr>
<td>149 Environmental Physiology of Domestic Animals</td>
<td></td>
</tr>
<tr>
<td>1XX All other undergraduate Physiology courses</td>
<td></td>
</tr>
<tr>
<td>2XX Graduate courses in Physiology</td>
<td></td>
</tr>
<tr>
<td>3XX Professional courses in Physiology</td>
<td></td>
</tr>
</tbody>
</table>

## Concordance List for Zoology (ZOO)

<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Concepts of Zoology</td>
<td>Evolution and Ecology 92 Internship</td>
</tr>
<tr>
<td>92 Internship</td>
<td>Evolution and Ecology 99 Special Study for Lower Division Students</td>
</tr>
<tr>
<td>99 Special Study for Lower Division Students</td>
<td>Molecular &amp; Cellular Biol 150 Embryology</td>
</tr>
<tr>
<td>100 Embryology</td>
<td>Molecular &amp; Cellular Biol 150 Laboratory in Vertebrate Embryology</td>
</tr>
<tr>
<td>100L Laboratory in Vertebrate Embryology</td>
<td>Molecular &amp; Cellular Biol 151 Advanced Developmental Biology</td>
</tr>
<tr>
<td>101 Advanced Developmental Biology</td>
<td>Molecular &amp; Cellular Biol 159 Senior Colloquium in Developmental Biology</td>
</tr>
<tr>
<td>102 Senior Colloquium in Developmental Biology</td>
<td>Evolution and Ecology 105 Phylogenetic Analysis of Vertebrate Structure</td>
</tr>
<tr>
<td>105 Phylogenetic Analysis of Vertebrate Structure</td>
<td>Evolution and Ecology 112 Invertebrate Zoology</td>
</tr>
<tr>
<td>112 Invertebrate Zoology</td>
<td>Evolution and Ecology 112L Laboratory for Invertebrate Zoology</td>
</tr>
<tr>
<td>112L Laboratory for Invertebrate Zoology</td>
<td>Biological Sciences 104 Regulation of Cell Function</td>
</tr>
<tr>
<td>121A Cell Biology — Last offering: Fall 1993</td>
<td>Molecular &amp; Cellular Biol 141 Cellular Regulation of Gene Expression</td>
</tr>
<tr>
<td>121B Cell Biology</td>
<td>Molecular &amp; Cellular Biol 142 Advanced Cell Biology: Contractile and Motile Systems</td>
</tr>
<tr>
<td>121C Advanced Cell Biology</td>
<td>Molecular &amp; Cellular Biol 140L Cell Biology Laboratory</td>
</tr>
<tr>
<td>121L Cell Biology Laboratory</td>
<td>Molecular &amp; Cellular Biol 146 Histology</td>
</tr>
<tr>
<td>122 Histology</td>
<td>Evolution and Ecology 101 Introduction to Ecology</td>
</tr>
<tr>
<td>125 Animal Ecology</td>
<td>Biological Sciences 104 Regulation of Cell Function</td>
</tr>
<tr>
<td>130 Survey of Cell Biology — Last offering: Fall 1993</td>
<td>Evolution and Ecology 133 Patterns in Vertebrate Biology</td>
</tr>
<tr>
<td>133 Patterns in Vertebrate Biology</td>
<td>Evolution and Ecology 134 Herpetology</td>
</tr>
<tr>
<td>134 Herpetology</td>
<td>Evolution and Ecology 134L Herpetology Laboratory</td>
</tr>
<tr>
<td>134L Herpetology Laboratory</td>
<td>Evolution and Ecology 136 Mammalogy</td>
</tr>
<tr>
<td>136 Mammalogy</td>
<td>Evolution and Ecology 136L Mammalogy Laboratory</td>
</tr>
<tr>
<td>136L Mammalogy Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
<table>
<thead>
<tr>
<th>Old Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>137 Ornithology</td>
<td>Evolution and Ecology 137 Ornithology</td>
</tr>
<tr>
<td>137L Ornithology Laboratory</td>
<td>Evolution and Ecology 137L Ornithology Laboratory</td>
</tr>
<tr>
<td>138 Ecology of Tropical Latitudes</td>
<td>Evolution and Ecology 138 Ecology of Tropical Latitudes</td>
</tr>
<tr>
<td>141 Principles of Systematic Zoology</td>
<td>Evolution and Ecology 141 Principles of Systematic Zoology</td>
</tr>
<tr>
<td>142 Invertebrate Physiology</td>
<td>NeuroPhysioBehavior 142 Invertebrate Physiology</td>
</tr>
<tr>
<td>142L Invertebrate Physiology Laboratory</td>
<td>NeuroPhysioBehavior 142L Invertebrate Physiology Laboratory</td>
</tr>
<tr>
<td>143 Neurobiology</td>
<td>NeuroPhysioBehavior 143 Neurobiology</td>
</tr>
<tr>
<td>143L Neurobiology Laboratory</td>
<td>NeuroPhysioBehavior 143L Neurobiology Laboratory</td>
</tr>
<tr>
<td>147 Zoogeography</td>
<td>Evolution and Ecology 147 Zoogeography</td>
</tr>
<tr>
<td>148 Animal Phylogeny and Evolution</td>
<td>Evolution and Ecology 148 Evolutionary Biology and Evolution</td>
</tr>
<tr>
<td>149 Evolution of Ecological Systems</td>
<td>Evolution and Ecology 149 Evolution of Ecological Systems</td>
</tr>
<tr>
<td>155 Behavior of Animals</td>
<td>NeuroPhysioBehavior 155 Behavior of Animals</td>
</tr>
<tr>
<td>170 Comparative Biomechanics</td>
<td>Evolution and Ecology 170 Comparative Biomechanics</td>
</tr>
<tr>
<td>170L Comparative Biomechanics Laboratory</td>
<td>Evolution and Ecology 170L Comparative Biomechanics Laboratory</td>
</tr>
<tr>
<td>189 Introduction to Biological Research</td>
<td>Evolution and Ecology 189 Introduction to Research</td>
</tr>
<tr>
<td>190 Undergraduate Seminar in Zoology</td>
<td>Evolution and Ecology 190 Undergraduate Seminar in Evolution and Ecology</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Evolution and Ecology 192 Internship</td>
</tr>
<tr>
<td>194H Research Honors in Zoology</td>
<td>Evolution and Ecology 194H Research Honors</td>
</tr>
<tr>
<td>197T Tutoring in Zoology</td>
<td>Evolution and Ecology 197T Tutoring</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Evolution and Ecology 198 Directed Group Study</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Evolution and Ecology 199 Special Study for Advanced Undergraduates</td>
</tr>
<tr>
<td>200 Current Techniques in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 200A Current Techniques in Cell Biology</td>
</tr>
<tr>
<td>200LA Cell and Developmental Biology Laboratory</td>
<td>Cell &amp; Devel Biology 200LA Cell and Developmental Biology Laboratory</td>
</tr>
<tr>
<td>200LB Cell and Developmental Biology Laboratory</td>
<td>Cell &amp; Devel Biology 200LB Cell and Developmental Biology Laboratory</td>
</tr>
<tr>
<td>202 Biomechanics</td>
<td>Molecular &amp; Cellular Biol 202 Biomechanics</td>
</tr>
<tr>
<td>203 Global and Regional Modeling</td>
<td>Molecular &amp; Cellular Biol 203 Global and Regional Modeling</td>
</tr>
<tr>
<td>204 Cellular Basis of Morphogenesis</td>
<td>Molecular &amp; Cellular Biol 204 Cellular Basis of Morphogenesis</td>
</tr>
<tr>
<td>205 Pattern Formation</td>
<td>Molecular &amp; Cellular Biol 205 Pattern Formation</td>
</tr>
<tr>
<td>206 Mechanisms of Organogenesis</td>
<td>Molecular &amp; Cellular Biol 206 Mechanisms of Organogenesis</td>
</tr>
<tr>
<td>208 Molecular Mechanisms in Animal Development</td>
<td>Molecular &amp; Cellular Biol 208 Molecular Mechanisms in Animal Development</td>
</tr>
<tr>
<td>212 Topics in Invertebrate Evolution</td>
<td>Population Biol (Grad) 212 Topics in Invertebrate Evolution</td>
</tr>
<tr>
<td>221 Behavioral Ecology</td>
<td>Evolution and Ecology 221 Behavioral Ecology</td>
</tr>
<tr>
<td>223 Modeling in Behavioral and Evolutionary Ecology</td>
<td>Population Biol (Grad) 223 Modeling in Behavioral and Evolutionary Ecology</td>
</tr>
<tr>
<td>225 Biology of Fertilization</td>
<td>Molecular &amp; Cellular Biol 225 Biology of Fertilization</td>
</tr>
<tr>
<td>226 Cell and Molecular Biology of Cancer</td>
<td>Molecular &amp; Cellular Biol 226 Cell and Molecular Biology of Cancer</td>
</tr>
<tr>
<td>236 Muscle Physiology</td>
<td>Molecular &amp; Cellular Biol 236 Muscle Physiology</td>
</tr>
<tr>
<td>240 Topics in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 240 Topics in Cell Biology</td>
</tr>
<tr>
<td>241 Membrane Biology</td>
<td>Molecular &amp; Cellular Biol 241 Membrane Biology</td>
</tr>
<tr>
<td>242 Research Conference in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 242 Research Conference in Cell Biology</td>
</tr>
<tr>
<td>243 Topics in Cellular and Behavioral Neurobiology</td>
<td>Neurobiology 243 Topics in Cellular and Behavioral Neurobiology</td>
</tr>
<tr>
<td>244 Seminar in Cell Biology</td>
<td>Molecular &amp; Cellular Biol 244 Seminar in Cell Biology</td>
</tr>
<tr>
<td>249 Research</td>
<td>Molecular &amp; Cellular Biol 249 Research</td>
</tr>
<tr>
<td>250 Seminar in Development</td>
<td>Evolution and Ecology 250 Seminar in Development</td>
</tr>
<tr>
<td>256 Seminar in Geographical Ecology</td>
<td>Evolution and Ecology 256 Seminar in Geographical Ecology</td>
</tr>
<tr>
<td>259 Group Study</td>
<td>Evolution and Ecology 259 Group Study</td>
</tr>
<tr>
<td>300 Methods of Teaching Zoology</td>
<td>Evolution and Ecology 300 Methods of Teaching</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.
# New Sections

## Concordance List for Biological Sciences (BIS)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>101  Gene and Gene Expression</td>
<td>Genetics 100</td>
</tr>
<tr>
<td>102  Structure and Function of Biomolecules</td>
<td>Biochem &amp; Biophys 101A</td>
</tr>
<tr>
<td>103  Bioenergetics and Metabolism</td>
<td>BCP 101B</td>
</tr>
<tr>
<td>104  Regulation of Cell Function</td>
<td>Botany/Zoology 130</td>
</tr>
<tr>
<td>- Effective Spring Quarter 1994</td>
<td>- Last offering Fall 1993</td>
</tr>
<tr>
<td>XX, 1XX, 2XX</td>
<td>Biology Sciences XX, 1XX, 2XX</td>
</tr>
<tr>
<td>All existing undergraduate and graduate courses</td>
<td>No change to existing courses or numbers.</td>
</tr>
</tbody>
</table>

## Concordance List for Evolution and Ecology (EVE)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>92   Internship</td>
<td>Zoology 92</td>
</tr>
<tr>
<td>99   Special Study for Lower Division Students</td>
<td>Zoology 99</td>
</tr>
<tr>
<td>100  Introduction to Evolution</td>
<td>Botany 100</td>
</tr>
<tr>
<td>101  Introduction to Ecology</td>
<td>Genetics 103</td>
</tr>
<tr>
<td>102  Advanced Evolution</td>
<td>Zoology 148</td>
</tr>
<tr>
<td>105  Phylogenetic Analysis of Vertebrate Structure</td>
<td>Genetics 106</td>
</tr>
<tr>
<td>106  Evolutionary Quantitative Genetics</td>
<td>Zoology 125</td>
</tr>
<tr>
<td>112  Invertebrate Zoology</td>
<td>Genetics 105</td>
</tr>
<tr>
<td>112L  Laboratory for Invertebrate Zoology</td>
<td>Zoology 105</td>
</tr>
<tr>
<td>117  Plant Ecology (Same course as Plant Biology 117)</td>
<td>Zoology 112L</td>
</tr>
<tr>
<td>133  Patterns in Vertebrate Biology</td>
<td>Botany 117</td>
</tr>
<tr>
<td>134  Herpetology</td>
<td>Zoology 133</td>
</tr>
<tr>
<td>134L  Herpetology Laboratory</td>
<td>Zoology 134</td>
</tr>
<tr>
<td>136  Mammalogy</td>
<td>Zoology 136</td>
</tr>
<tr>
<td>136L  Mammalogy Laboratory</td>
<td>Zoology 136L</td>
</tr>
<tr>
<td>137  Ornithology</td>
<td>Zoology 136L</td>
</tr>
<tr>
<td>137L  Ornithology Laboratory</td>
<td>Zoology 137</td>
</tr>
<tr>
<td>138  Ecology of Tropical Latitudes</td>
<td>Zoology 137L</td>
</tr>
<tr>
<td>140  Paleobotany</td>
<td>Zoology 138</td>
</tr>
<tr>
<td>141  Principles of Systematic Zoology</td>
<td>Paleobotany</td>
</tr>
<tr>
<td>144  Plant Geography</td>
<td>Zoology 141</td>
</tr>
<tr>
<td>147  Zoogeography</td>
<td>Zoology 144</td>
</tr>
<tr>
<td>149  Evolution of Ecological Systems</td>
<td>Zoology 147</td>
</tr>
<tr>
<td>150  Comparative Biomechanics</td>
<td>Zoology 149</td>
</tr>
<tr>
<td>170L  Comparative Biomechanics Laboratory</td>
<td>Zoology 150</td>
</tr>
<tr>
<td>189  Introduction to Research</td>
<td>Paleobotany</td>
</tr>
<tr>
<td>190  Undergraduate Seminar</td>
<td>Zoology 190</td>
</tr>
<tr>
<td>192  Internship</td>
<td>Zoology 192</td>
</tr>
<tr>
<td>194HABC Research Honors</td>
<td>Zoology 194HABC</td>
</tr>
<tr>
<td>197T  Tutoring</td>
<td>Zoology 197T</td>
</tr>
<tr>
<td>198  Directed Group Study</td>
<td>Zoology 198</td>
</tr>
<tr>
<td>199  Special Study for Advanced Undergraduates</td>
<td>Zoology 199</td>
</tr>
<tr>
<td>221  Behavioral Ecology</td>
<td>Zoology 221</td>
</tr>
<tr>
<td>240  Paleobotany and Angiosperm Evolution</td>
<td>Botany 240</td>
</tr>
<tr>
<td>243  Palynology</td>
<td>Botany 243</td>
</tr>
<tr>
<td>287  Seminar in Animal Behavior</td>
<td>Zoology 287</td>
</tr>
<tr>
<td>290  Current Topics</td>
<td>Zoology 290</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
## Concordance List for Evolution and Ecology (EVE) continued

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>290C Research Conference</td>
<td>Zoology 290C Research Conference in Zoology</td>
</tr>
<tr>
<td>296 Group Study</td>
<td>Zoology 298 Group Study</td>
</tr>
<tr>
<td>299 Research</td>
<td>Zoology 299 Research</td>
</tr>
<tr>
<td>390 Methods of Teaching</td>
<td>Zoology 390 Methods of Teaching Zoology</td>
</tr>
</tbody>
</table>

## Concordance List for Molecular and Cellular Biology (MCB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10  Introduction to Human Heredity</td>
<td>Genetics 10 Heredity and Evolution</td>
</tr>
<tr>
<td>99  Special Study</td>
<td>Genetics 99 Special Study for Undergraduates</td>
</tr>
<tr>
<td>120L Biochemistry Laboratory</td>
<td>Biochem &amp; Biophys 101L General Biochemistry Laboratory</td>
</tr>
<tr>
<td>121 Molecular Biology of Eukaryotic Cells</td>
<td>Biochem &amp; Biophys 153 Molecular Biology of Eukaryotic Cells</td>
</tr>
<tr>
<td>122 Structure and Function of Proteins</td>
<td>Biochem &amp; Biophys 143 Structure-Function Relations of Proteins</td>
</tr>
<tr>
<td>123 Behavior and Analysis of Enzyme Systems</td>
<td>Biochem &amp; Biophys 133 Behavior and Analysis of Enzyme Systems</td>
</tr>
<tr>
<td>126 Plant Biochemistry</td>
<td>Biochem &amp; Biophys 122 Plant Biochemistry</td>
</tr>
<tr>
<td>138 Undergraduate Seminar in Biochemistry</td>
<td>Biochem &amp; Biophys 190 Undergraduate Seminar in Biochemistry</td>
</tr>
<tr>
<td>140L Cell Biology Laboratory</td>
<td>Zoology 121L Cell Biology Laboratory</td>
</tr>
<tr>
<td>141 Cellular Regulation of Gene Expression</td>
<td>Zoology 121B Cell Biology</td>
</tr>
<tr>
<td>142 Advanced Cell Biology: Contractile and Motile Systems</td>
<td>Zoology 121C Advanced Cell Biology</td>
</tr>
<tr>
<td>146 Histology</td>
<td>Zoology 122 Histology</td>
</tr>
<tr>
<td>148 Undergraduate Seminar in Cell Biology</td>
<td>Zoology 100 Embryology</td>
</tr>
<tr>
<td>150 Embryology</td>
<td>Zoology 100L Laboratory in Vertebrate Embryology</td>
</tr>
<tr>
<td>151 Advanced Developmental Biology</td>
<td>Zoology 101 Advanced Developmental Biology</td>
</tr>
<tr>
<td>155 Senior Colloquium in Developmental Biology</td>
<td>Zoology 102 Senior Colloquium in Developmental Biology</td>
</tr>
<tr>
<td>160L Principles of Genetics Laboratory</td>
<td>Genetics 100L Principles of Genetics Laboratory</td>
</tr>
<tr>
<td>161 Molecular Genetics</td>
<td>Genetics 102A Molecular Genetics</td>
</tr>
<tr>
<td>162 Human Genetics</td>
<td>Genetics 107 Human Genetics</td>
</tr>
<tr>
<td>163 Developmental Genetics</td>
<td>Genetics 104 Developmental Genetics</td>
</tr>
<tr>
<td>164 Chromosome Structure and Function</td>
<td>Genetics 144 Advanced Developmental Genetics</td>
</tr>
<tr>
<td>166 Advanced Developmental Genetics</td>
<td>Genetics 102L Advanced Molecular Genetics Laboratory</td>
</tr>
<tr>
<td>170L Advanced Molecular Genetics Laboratory</td>
<td>Genetics 191 Undergraduate Seminar in Molecular Genetics</td>
</tr>
<tr>
<td>178 Undergraduate Seminar in Molecular Genetics</td>
<td>Genetics 190C Introduction to Genetics Research</td>
</tr>
<tr>
<td>190C Undergraduate Research Conference</td>
<td>Biochem &amp; Biophys 192 Internship</td>
</tr>
<tr>
<td>191 Introduction to Research</td>
<td>Genetics 192 Internship</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Genetics 193 Research Seminar in Current Topics</td>
</tr>
<tr>
<td>193 Advanced Research</td>
<td>Biochem &amp; Biophys 194H Biochemistry Honors</td>
</tr>
<tr>
<td>194H Research Honors</td>
<td>Biochem &amp; Biophys 197T Tutoring in Biochemistry</td>
</tr>
<tr>
<td>197T Tutoring</td>
<td>Genetics 197T Tutoring in Genetics</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Biochem &amp; Biophys 198 Directed Group Study</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Biochem &amp; Biophys 199 Special Study for Advanced Undergraduates</td>
</tr>
<tr>
<td>200A Current Techniques in Cell Biology</td>
<td>Genetics 199 Special Study for Advanced Undergraduates</td>
</tr>
<tr>
<td>200B Current Techniques in Biochemistry</td>
<td>Biochem &amp; Biophys 200 Current Techniques in Cell Biology</td>
</tr>
<tr>
<td>200C Current Techniques in Biophysics (same course as Biophysics 210)</td>
<td>Biochem &amp; Biophys (Grad) 200 Current Techniques in Biophysics (same course as Molecular &amp; Cellular Biol 200C)</td>
</tr>
<tr>
<td>220L Advanced Biochemistry Laboratory Rotations</td>
<td>Biochem &amp; Biophys 202L Advanced Biochemistry Laboratory</td>
</tr>
<tr>
<td>221A Physical and Chemical Biochemistry</td>
<td>Biochem &amp; Biophys 201A Physical and Chemical Biochemistry</td>
</tr>
<tr>
<td>221B Integration of Metabolism and Regulatory Phenomena</td>
<td>Biochem &amp; Biophys 2018 Integration of Metabolism and Regulatory Phenomena</td>
</tr>
<tr>
<td>221C Molecular Biology</td>
<td>Biochem &amp; Biophys 201C Molecular Biology</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
### Concordance List for Molecular and Cellular Biology (MCB) continued

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>221D Cellular Biochemistry</td>
<td>Biochem &amp; Biophys 204D Cellular Biochemistry</td>
</tr>
<tr>
<td>231 Membrane Biochemistry</td>
<td>Biochem &amp; Biophys 208 Membrane Biochemistry</td>
</tr>
<tr>
<td>232 Chemical Modifications of Proteins</td>
<td>Biochem &amp; Biophys 212 Chemical Modifications of Proteins</td>
</tr>
<tr>
<td>241 Membrane Biology</td>
<td>Zoology 241 Membrane Biology</td>
</tr>
<tr>
<td>242 Muscle Biophysics</td>
<td>Zoology 236 Muscle Physiology</td>
</tr>
<tr>
<td>248 Seminar in Cell Biology</td>
<td>Zoology 266 Seminar in Cell Biology</td>
</tr>
<tr>
<td>249 Literature in Cell Biology</td>
<td>Zoology 242 Research Conference in Cell Biology</td>
</tr>
<tr>
<td>250 Special Topics in Cell Biology</td>
<td>Zoology 240 Topics in Cell Biology</td>
</tr>
<tr>
<td>251 Biology of Fertilization</td>
<td>Zoology 225 Biology of Fertilization</td>
</tr>
<tr>
<td>252 Cellular Basis of Morphogenesis</td>
<td>Zoology 204 Cellular Basis of Morphogenesis</td>
</tr>
<tr>
<td>253 Pattern Formation</td>
<td>Zoology 205 Pattern Formation</td>
</tr>
<tr>
<td>254 Mechanisms of Organogenesis</td>
<td>Zoology 206 Mechanisms of Organogenesis</td>
</tr>
<tr>
<td>255 Molecular Mechanisms in Animal Development</td>
<td>Zoology 208 Molecular Mechanisms in Animal Development</td>
</tr>
<tr>
<td>256 Cell and Molecular Biology of Cancer</td>
<td>Zoology 226 Cell and Molecular Biology of Cancer</td>
</tr>
<tr>
<td>258 Seminar in Development</td>
<td>Zoology 292 Seminar in Development</td>
</tr>
<tr>
<td>259 Literature in Developmental Biology</td>
<td>Zoology 269 Research Conference in Developmental Biology</td>
</tr>
<tr>
<td>262 Recombinant DNA and Genetic Engineering</td>
<td>Genetics 202 Plasmids, Recombinant DNA, and Genetic Engineering</td>
</tr>
<tr>
<td>290C Research Conference</td>
<td>Biochem &amp; Biophys 250 Biochemical Literature</td>
</tr>
<tr>
<td>291 Current Progress in Molecular and Cellular Biology</td>
<td>Genetics 290C Research Conference in Genetics</td>
</tr>
<tr>
<td>295 Literature in Molecular and Cellular Biology</td>
<td>Biochem &amp; Biophys 291 Current Progress in Biochemistry</td>
</tr>
<tr>
<td>296 Research Seminar</td>
<td>Biochem &amp; Biophys 270 Advanced Research Conference</td>
</tr>
<tr>
<td>298 Group Study</td>
<td>Biochem &amp; Biophys 298 Group Study</td>
</tr>
<tr>
<td>299 Research</td>
<td>Biochem &amp; Biophys 299 Group Study</td>
</tr>
<tr>
<td>300 Methods of Teaching</td>
<td>Biochem &amp; Biophys 300 Research</td>
</tr>
</tbody>
</table>

### Concordance List for Microbiology (MIC)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX, 1XX, 2XX Undergraduate and graduate courses in Microbiology</td>
<td>Microbiology XX, 1XX, 2XX No change to existing courses or numbers</td>
</tr>
</tbody>
</table>

### Concordance List for Neurobiology, Physiology and Behavior (NPB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Elementary Physiology</td>
<td>Physiology 10 Elementary Physiology</td>
</tr>
<tr>
<td>100B Cellular Physiology</td>
<td>Physiology 100B Cellular Physiology</td>
</tr>
<tr>
<td>100L Cellular Physiology Laboratory</td>
<td>Physiology 100L Cellular Physiology Laboratory</td>
</tr>
<tr>
<td>106 Experiments in Physiology: Design and Execution</td>
<td>Physiology 106 Experiments in Physiology: Design and Execution</td>
</tr>
<tr>
<td>110 Systemic Physiology</td>
<td>Physiology 110 Systemic Physiology</td>
</tr>
<tr>
<td>110L Systemic Physiology Laboratory</td>
<td>Physiology 110L Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>111ABC Advanced Systemic Physiology Laboratory</td>
<td>Physiology 111ABC Advanced Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>112 Neuroscience</td>
<td>Physiology 112 Neuroscience</td>
</tr>
<tr>
<td>113 Cardiovascular, Respiratory, and Renal Physiology</td>
<td>Physiology 113 Cardiovascular, Respiratory, and Renal Physiology</td>
</tr>
<tr>
<td>114 Gastrointestinal Physiology</td>
<td>Physiology 114 Gastrointestinal Physiology</td>
</tr>
<tr>
<td>117 Avian Physiology</td>
<td>Physiology 117 Avian Physiology</td>
</tr>
<tr>
<td>120A Comparative Physiology: Neurointegrative Mechanisms</td>
<td>Physiology 120A Comparative Physiology: Neurointegrative Mechanisms</td>
</tr>
<tr>
<td>120B Comparative Physiology: Circulation</td>
<td>Physiology 120B Comparative Physiology: Circulation</td>
</tr>
<tr>
<td>120D Comparative Physiology: Endocrinology</td>
<td>Physiology 120D Comparative Physiology: Endocrinology</td>
</tr>
<tr>
<td>120E Comparative Physiology: Respiration</td>
<td>Physiology 120E Comparative Physiology: Respiration</td>
</tr>
<tr>
<td>120F Comparative Physiology of Sensory Systems</td>
<td>Physiology 120F Comparative Physiology of Sensory Systems</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
### Concordance List for Neurobiology, Physiology and Behavior (NPB) continued

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>121 Physiology of Reproduction</td>
<td>Physiology 121</td>
</tr>
<tr>
<td>121L Physiology of Reproduction Laboratory</td>
<td>Physiology 121L</td>
</tr>
<tr>
<td>130 Physiology of the Endocrine Glands</td>
<td>Physiology 130</td>
</tr>
<tr>
<td>142 Invertebrate Physiology</td>
<td>Zoology 142</td>
</tr>
<tr>
<td>142L Invertebrate Physiology Laboratory</td>
<td>Zoology 142L</td>
</tr>
<tr>
<td>143 Neurobiology Laboratory</td>
<td>Zoology 143</td>
</tr>
<tr>
<td>143L Neurobiology Laboratory</td>
<td>Zoology 143L</td>
</tr>
<tr>
<td>148 Principles of Environmental Physiology</td>
<td>Zoology 148</td>
</tr>
<tr>
<td>155 Behavior of Animals</td>
<td>Zoology 155</td>
</tr>
<tr>
<td>190 Proseminar in Physiology</td>
<td>Physiology 190</td>
</tr>
<tr>
<td>190C Introduction to Physiological Research</td>
<td>Physiology 190C</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Physiology 192</td>
</tr>
<tr>
<td>194HABC Physiology—Honors</td>
<td>Physiology 194HABC</td>
</tr>
<tr>
<td>196AB Voluntary Control of Physiological Processes</td>
<td>Physiology 196AB</td>
</tr>
<tr>
<td>197T Tutoring in Physiology</td>
<td>Physiology 197T</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Physiology 198</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Physiology 199</td>
</tr>
</tbody>
</table>

### Concordance List for Plant Biology (PLB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Old Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Plants, People and the Biosphere</td>
<td>Botany 10</td>
</tr>
<tr>
<td>92 Internship</td>
<td>Botany 92</td>
</tr>
<tr>
<td>96 Directed Group Study</td>
<td>Botany 96</td>
</tr>
<tr>
<td>99 Special Study for Undergraduates</td>
<td>Botany 98</td>
</tr>
<tr>
<td>101 Survey of Plant Communities of California</td>
<td>Botany 101</td>
</tr>
<tr>
<td>102 California Floristics</td>
<td>Botany 102</td>
</tr>
<tr>
<td>105 Developmental Plant Anatomy</td>
<td>Botany 105</td>
</tr>
<tr>
<td>108 Systematic Botany of Flowering Plants</td>
<td>Botany 108</td>
</tr>
<tr>
<td>111 Plant Physiology</td>
<td>Botany 111</td>
</tr>
<tr>
<td>111D Problems in Plant Physiology</td>
<td>Botany 111D</td>
</tr>
<tr>
<td>111L Introductory Plant Physiology Laboratory</td>
<td>Botany 111L</td>
</tr>
<tr>
<td>112 Plant Growth and Development</td>
<td>Botany 112</td>
</tr>
<tr>
<td>112D Problems in Plant Growth and Development</td>
<td>Botany 112D</td>
</tr>
<tr>
<td>116 Plant Development and Evolution</td>
<td>Botany 116</td>
</tr>
<tr>
<td>117 Plant Ecology (same course as Evolution and Ecology 117)</td>
<td>Botany 117</td>
</tr>
<tr>
<td>118 Introduction to Phycology</td>
<td>Botany 118</td>
</tr>
<tr>
<td>119 Introduction to Mycology</td>
<td>Botany 119</td>
</tr>
<tr>
<td>120 Introduction to Weed Science</td>
<td>Botany 120</td>
</tr>
<tr>
<td>121 Biology of Weeds</td>
<td>Botany 121</td>
</tr>
<tr>
<td>122 Action of Herbicides</td>
<td>Botany 122</td>
</tr>
<tr>
<td>125 Molecular Biology of Plant Development</td>
<td>Botany 125</td>
</tr>
<tr>
<td>135 Mineral Nutrition of Plants</td>
<td>Botany 135</td>
</tr>
<tr>
<td>150 Biology and Management of Freshwater Macrophytes</td>
<td>Botany 150</td>
</tr>
<tr>
<td>155 Anatomical and Cytological Methods</td>
<td>Botany 155</td>
</tr>
<tr>
<td>156 Experiments in Plant Biology: Design and Execution</td>
<td>Botany 190C</td>
</tr>
<tr>
<td>189 Research Conference in Botany</td>
<td>Botany 192</td>
</tr>
<tr>
<td>194H Internship</td>
<td>Botany 194H</td>
</tr>
<tr>
<td>197T Tutoring in Botany</td>
<td>Botany 197T</td>
</tr>
<tr>
<td>198 Directed Group Study</td>
<td>Botany 198</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Botany 199</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.*
Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group
Office: 154 Briggs Hall (916-752-9031)

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 M.S. and Ph.D. degrees. 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 advisor, and a group member. The committee meets to consider individual educational needs with the student.

Graduate Adviser: A.H. Maki (Chemistry).

Courses in Biophysics (BPH)

Graduate Courses

200. Current Techniques in Biophysics (2). 3. The Staff. Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics, including electron microscopy, chemical spectroscopy, and x-ray diffraction. Laboratory assignments may be given. (SU grading only.)

200A. Biophysics Laboratory (3). I, II, III. The Staff. (Chairperson in charge) Laboratory—12 hours (5 weeks). Prerequisite: course 200 (may be taken concurrently). Laboratory assignments in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on experimental and theoretical aspects. (SU grading only.)

200B. Biophysics Laboratory (6). I, II, III. The Staff. (Chairperson in charge) Laboratory—24-hour rotations (5 weeks each). Prerequisite: course 200 (may be taken concurrently). Two-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on experimental and theoretical aspects. (SU grading only.)

200C. 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 200 concurrently. Presentations and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (SU grading only.)

250. Group Study (1). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

250B. Research (1-5). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Botany (A Graduate Group)

Students admitted into the Botany Graduate Group before June 10, 1989, will be allowed to complete their degrees in this subject. New students, however, should see the Plant Biology Graduate Group section in this catalog.

Courses in Cell and Developmental Biology (CDB)

Graduate Courses

200. Current Techniques in Cell Biology (2). 3. 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, spectrophotometry, electron microscopy, histochemistry, immunohistochemistry, and electron microscopy. (SU grading only.)

200A. Cell and Developmental Biology Laboratory (3). I, II, III. The Staff. Laboratory—12 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 experimental and theoretical aspects. (SU grading only.)

200B. Cell and Developmental Biology Laboratory (6). I, II, III. The Staff. Laboratory—12 hours. Prerequisite: course 200 (may be taken concurrently). Two-five week assignments in the research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on experimental and theoretical aspects. (SU grading only.)

205. Cell Biology of the Cytoskeleton (2). 3. Tablin. Lecture—1 hour and discussion 2 hours (course hours entered to run sequentially); student presents critical analysis of current journal articles and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins, actin, tubulin, intermediate filaments, myosin, and other cytoskeleton-related proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (SU grading only.) Offered in alternate years.

250. Research Conference 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. (SU grading only.)

250B. Group Study (1-5). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

250. Research (1-2). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Botany (A Graduate Group)

See Asian American Studies.

Cell and Developmental Biology (A Graduate Group)

Carol A. Erickson, Ph.D., Chairperson of the Group (916-752-9031)

Group Office: 154 Briggs Hall (916-752-9031)

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. Specific programs of study are decided upon by an advisory committee chaired by the student's research advisor, and the majority of the coursework 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 biology.

Graduate Adviser: C.A. Erickson (Molecular and Cellular Biology); S. Kozek (Cell Biology and Human Anatomy).

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, spectrophotometry, electron microscopy, histochemistry, immunohistochemistry, and electron microscopy. (SU grading only.)

200A. Cell and Developmental Biology Laboratory (3). I, II, III. The Staff. Laboratory—12 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 experimental and theoretical aspects. (SU grading only.)

200B. Cell and Developmental Biology Laboratory (6). I, II, III. The Staff. Laboratory—12 hours. Prerequisite: course 200 (may be taken concurrently). Two-five week assignments in the research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on experimental and theoretical aspects. (SU grading only.)

205. Cell Biology of the Cytoskeleton (2). I. Tablin. Lecture—1 hour and discussion 2 hours (course hours entered to run sequentially); student presents critical analysis of current journal articles and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins, actin, tubulin, intermediate filaments, myosin, and other cytoskeleton-related proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (SU grading only.) Offered in alternate years.

250. Research Conference 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. (SU grading only.)

250B. Group Study (1-5). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

250. Research (1-2). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Cell Biology and Human Anatomy

See Medicine, School of
Chemistry

(College of Letters and Science)

Kevin M. Smith, Ph.D., Chairperson of the Department

William H. Fink, Ph.D., Vice-Chairperson of the Department

Peter A. Rock, Ph.D., Vice-Chairperson of the Department

Department Office, 186 Chemistry Building
(916-752-0503/0553, FAX 916-752-8895)

Faculty

Alan L. Baich, Ph.D., Professor
R. David Brit, Ph.D., Assistant Professor
Timothy C. Donnelly, Ph.D., Lecturer
W. Ronald Fawcett, Ph.D., Professor
Will M. Smith, Ph.D., Professor
Edwin C. Friedel, Ph.D., Professor
Steven S. Friedel, Ph.D., Lecturer
William M. Jackson, Ph.D., Professor
Susan M. Kaulbars, Ph.D., Associate Professor
Joel E. Keizer, Ph.D., Professor
Peter B. Kelly, Ph.D., Assistant Professor
Mark J. Kurf, Ph.D., Professor
Gerd N. LeBlanc, Ph.D., Professor
Donald P. Land, Ph.D., Assistant Professor
Carlo B. LeBlanc, Ph.D., Assistant Professor
August H. Maki, Ph.D., Professor
Donald A. McGuire, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Claude F. Meares, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Tadeusz M. Malzoni, Ph.D., Assistant Professor
W. Kenneth Moler, Ph.D., Professor
Krishtan P. Nambiar, Ph.D., Assistant Professor
Michael H. Nantz, 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
Kevin M. Smith, Ph.D.
James H. Swinehart, Ph.D., Professor
Joyce Taekashii, Ph.D., Adjunct Professor
Dino S. Tins, Ph.D., Professor
Nancy S. True, Ph.D., Professor
Susan C. Tucker, Ph.D., Assistant 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. Botti, Ph.D., Professor Emeritus
Robert K. Brinon, Ph.D., Professor Emeritus
Helena Hop, Cand. real., Professor Emeritus
Raymond M. Keefer, Ph.D., Professor Emeritus
Richard E. Kepner, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Charles P. Naege, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Edgar P. Palmer, Ph.D. Professor Emeritus
David H. Peck, Ph.D., 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 would 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 pharmaceutical industry, pharmaceutics, and the photographic industry. The bachelor's 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
Preparatory Subject Matter..................38-39
Chemistry 2A-2B-ChC, 2D-2E-ChC, 2F-2G-ChC.............................15
Physics 2A-2B-SC, 2D-2E-SC.............................12
Mathematics 21A-21B-21C or 16A-16B-16C.............................9-12
Depth Subject Matter..................39
At least 14 additional upper division units in chemistry (except Chemistry 107A, or 107B) or biochemistry, or physics..............................14
Total Units for the Major..................75-78

B.S. Major Requirements:

UNITS
Preparatory Subject Matter..................53
Chemistry 2A-2B-ChC or 2A-2B-2C-2D-2E-2F-2G.............................15
Physics 9A, 9B, 9C, 9D.............................16
Mathematics 21A, 21B, 21C, 21D, 22A, 22B.............................22
Depth Subject Matter..................50
At least 12 additional upper division units in chemistry (except Chemistry 107A, or 107B), including organic work.............................12
Total Units for the Major..................103


Honors and Honors Program. The student must take courses 104A, 104B, and 104H.

Graduate Study. The Department of Chemistry offers courses 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 Division section in this catalog.

Courses in Chemistry (CHE)

Lower Division Courses

1A, 1B, 1C. General Chemistry
These courses have been canceled and replaced by courses 2A, 2B, 2C.

2A. General Chemistry (5) I. Wood, Jackson, Tinti; II. Donnelly, LeBlanc, McGuire.
Lecture - 3 hours; laboratory-discussion - 4 hours. Prerequisite: High school chemistry and physics; satisfy core acce 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 2B or 2C.

2B. General Chemistry (5) II. Donnelly, Land, LeBlanc, III. Donnelly, McGuire, Donnelly.
Lecture - 3 hours; laboratory-discussion - 4 hours. Prerequisite: course 2A or 2AH. Continuation of course 2A. Condensed systems, intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochromy, equilibria, and quantitative analysis using volumetric methods. General education credit for non-GE course sequence (2A-2B) which will satisfy one GE course: Nature and Environment.

2BH. Honors General Chemistry (5) II. True.
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 (may be 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 2C or 2D.

2C. General Chemistry (5) I. Tucker, Kauflarich, Ill. Power and staff. Lecture - 3 hours; laboratory - 6 hours. Prerequisite: course 2B or 2D. Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, applications of principles to chemical reactions. Laboratory experiments in kinetics, electrophotometry, quantitative analysis using instrumental methods. Qualitative analysis, and inorganic and organic synthesis.

2CH. Honors General Chemistry (5) II. Kauflarich.
Lecture - 3 hours; laboratory - 6 hours. Prerequisite: course 2B with consent of instructor or course 2D with a grade of C or better. and Mathematics 21C (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2C.

2A, 4A, 4B, 4C. General Chemistry
These courses have been canceled and replaced by courses 2AH, 2B, 2CH.

Lecture - 2 hours; laboratory - 6 hours. Prerequisite: course 1C with a grade of C or higher. An introduction to the principles and methods of quantitative chemical analysis with emphasis on the application of equilibrium theory to analytical problems. Students who have received credit for the 4A-4B-1C sequence may enroll in course 5 for units of credit only: not open to students who have received credit for 4A-4B-4C, or 2A-2B-2C.

Lecture - 3 hours. Prerequisite: course 1B 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 chemistry.

8B. Organic Chemistry: Brief Course (5) II. Takeashii, III. Friedel.
Lecture - 3 hours. Prerequisite: course 1B with a grade of C or higher. With course 8A an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds.

9. Introduction to General Chemistry (2). Donnelly.
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.

Lecture - 4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 1A. Course not open to students who have had
Chemistry 1A; but students with credit for course 10 may take Chemistry 1A for full credit. General Education credit: Nature and Environment.

94. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (PINP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) I, Fink

Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, and nuclear chemistry, and to surface chemistry and colloidal systems. Considerations on biorenewable processes.

109A. Physical Chemistry of Macromolecules (3) III. Schind

Lecture—3 hours. Prerequisite: course 107B or 110C. Properties and characterization of macromolecules with emphasis on those of biological interest. Structural thermodynamics, 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. McCammon, III. Kelley

Lecture—3 hours. Prerequisite: course 107B or 110C. Mathematical properties and characterization of macromolecules with emphasis on those of biological interest. Structural thermodynamics, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

110B. Physical Chemistry: Quantum Mechanics (3) I, II. Fink

Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. Physical Chemistry: Kinetics (3) II. Jackson, III. True

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. Tins

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 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.

115. Instrumental Analysis (4) II. Fawcett

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Theory and practice of modern instrumental analysis. Introductory chemical analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples having low concentration significance.

118A. Organic Chemistry for Health and Life Sciences (4) I. Schorr, III. Takahashi

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A or 110C with a grade of C- or higher. The 118A, 118B, 118C series is designed to fulfill the requirements of students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and on preparation and reactions of nonaromatic hydrocarbons, alkyl halides, alcohols and ethers.

118B. Organic Chemistry for Health and Life Sciences (4) I. E. Friedman, II. Musker

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118A. Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of nonaromatic hydrocarbons, organometallic compounds, aldehydes and ketones.

118C. Organic Chemistry for Health and Life Sciences (4) II. Miller, III. Schore

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on the preparation, purification, and characterization of nonaromatic hydrocarbons, aldehydes, and ketones.

120A. Physical Chemistry Laboratory: Advanced Methods (3) II

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118A or 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis or spectroscopic techniques.

124A. Inorganic Chemistry: Fundamentals (3) I. Kauftuch

Lecture—3 hours. Prerequisite: course 110C or 110D. 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. Powe

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

124C. Inorganic Chemistry: d and f Block Elements (3) III. Swinehart

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

126A. Organic Chemistry (3) I. Musker, II. Nantz

Lecture—3 hours. Prerequisite: course 110C or 110D. A continuation of course 126A. Continuation of course 126A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carboxylic compounds. Introduction to the application of spectroscopic methods to organic chemistry.

126B. Organic Chemistry (3) I. E. Friedman, II. E. Friedich

Lecture—3 hours. Prerequisite: course 126A or consent of instructor. Course 126A strongly recommended; chemistry majors should enroll in course 126B concurrently. Continuation of course 126A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carboxylic compounds. Introduction to the application of spectroscopic methods to organic chemistry.

126C. Organic Chemistry (3) I. Kurth, III. Musker

Lecture—3 hours. Prerequisite: course 126B. Chemistry majors should enroll in course 126C concurrently. Continuation of course 126B with emphasis on nucleic acid and protein synthesis, and selected biologically important compounds.

129A. Organic Chemistry Laboratory (4) I. Isidore; II. S. Friedich

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 126A or 126C with a grade of C or higher; course 126A may be taken concurrently. Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds. Only one unit of credit will be allowed for students who have taken course 88.

129B. Organic Chemistry Laboratory (2) II. Miller; III. S. Friedich

Laboratory—6 hours. Prerequisite: courses 129A and 129B. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.

129C. Organic Chemistry Laboratory (2) I. Isidore; III. Nambar

Laboratory—6 hours. Prerequisite: courses 129A and 129B. 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 129C. 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) II. Balch

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 129A, 129B, 129C. Integrated inorganic—organic course in the preparation, purification and characterization of multifunctional organic, organo-metallic, and transition metal compounds using a wide range of methods.

150. Chemistry of Natural Products (3) I. Mokhov

Lecture—3 hours. Prerequisite: course 129C. Chemistry of terpenes, steroids, acetonides, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

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. (PINP 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 an advisor 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. (PINP 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. (PINP 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. (PINP 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. (PINP grading only.)

*Course not offered this academic year.*
Graduate Courses

201. Basic Chemical Uses of Symmetry and Group Theory (2) I. Power
Lecture—3 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point groups, molecular symmetry, representations of groups. Applications to molecular orbitals and molecular vibrations.

205. Symmetry, Spectroscopy, and Structure (3) II. Malin
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; nuclear magnetic resonance spectroscopy; other physical methods.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3) III. Tint
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. Tucker
Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry: matrix representation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties.

210C. Quantum Chemistry: Molecular Spectroscopy (3) III. Malin
Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photochemistry.

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3) I. Britz
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) III.
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of non-equilibrium 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) I. Kelly
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 nuclear formulation of chemistry. Emphasis will vary in successive years. May be repeated for credit when topic differs. Offered in alternate years.

216. Magnetic Resonance Spectroscopy (3) II. Britz
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 structure, electron-nuclear double 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) I.
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.
Lecture—3 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular structure to protein conformation; equilibrium properties and chemical reactions; stereochemistry and physical-chemical determination of macromolecular structure. Offered in alternate years.

219. Spectroscopy of Organic Compounds (3) I. Molinski
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectrosopic methods—principally NMR, IR, and MS.

221A-H. Special Topics in Organic Chemistry (3) I, II, III. The Staff
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered. In general will emphasize the research interests of the staff member giving the course.

226. Principles of Transition Metal Chemistry (3) I. Bahal
Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reaction of transition metal compounds.

228A. Bio-Inorganic Chemistry (3) III. Swinehart
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Biochemistry 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 1996.)

228C. Solid-State Chemistry (3) III. Kauzlarich
Lecture—3 hours. Prerequisites: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and applications of solids; topics of current interest such as low-dimensional materials, inorganic polymers, and materials for catalysis. Offered every third year (next offering Spring 1995).

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) III. Shenvi
Lecture—3 hours. Prerequisites: 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. Shenvi
Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis, preparation, 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) III.
Lecture—3 hours. Prerequisite: course 128D 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 origins will be used as a unifying theme.

237. Bio-organic Chemistry (3) I. Nambar
Lecture—3 hours. Prerequisite: courses 110A and 115 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. Non-equilibrium data, thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentialometry and spectrophotometry; mass transfer in liquid solutions; fundamentals of separation science, including column, gas, and liquid chromatography.

241A-D. Special Topics in Analytical Chemistry (3) III. Fawcett
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 research literature in their immediate field of research and related areas. May be repeated for credit when topics differ.

263. Introduction to Chemical Research Methodology (6) III. The Staff
Laboratory/discussion—4 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 theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topics differ. (SU grading only.)

264. Advanced Chemical Research Methodology (6) 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. (SU grading only.)

265. Seminar (3) I, II, III. Nantz, Tucker
Seminar—2 hour. Prerequisite: consent of instructor. (SU grading only.)

269. Chemistry Research (1) The Staff (LeMar 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. (SU grading only.)

295. Industrial Chemistry (1) I. Kurb
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. (SU grading only.)

299. Group Study (1-5) 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 depart-

*Course not offered this academic year.*
Chicana/Chicano Studies

(College of Letters and Science)
Beatriz Pesquera, Ph.D., Program Director
Program Office, Hart Hall, 2nd Floor (916-752-2421)
George Singh, Program Coordinator/Student Affairs (916-752-2492)

Committee in Charge
Rina Alcalay, Ph.D. (Rhetoric and Communication)
Richard Berteaux, Ph.D. (Environmental Design)
Angie C. Chabram, Ph.D. (Chicana/o Studies)
Yvette Flores-Ontiz, Ph.D. (Chicana/o Studies)
Rosa Linda Fregoso, Ph.D. (Chicana/o Studies, Women’s Studies)
Maluqas Montoya, Ph.D. (Chicana/o Studies)
Beatriz Pesquera, Ph.D. (Chicana/o Studies, Women’s Studies)
Adaliza Sosa-Riddell, Ph.D. (Chicana/o Studies)
Reugio I. Rochin, Ph.D. (Chicana/o Studies, Agricultural Economics)

Faculty
Angie C. Chabram, Ph.D., Associate Professor (Chicana/o Studies)
Yvette Flores-Ontiz, Ph.D., Assistant Professor (Chicana/o Studies)
Rosa Linda Fregoso, Ph.D., Assistant Professor (Chicana/o Studies, Women’s Studies)
Maluqas Montoya, Professor (Chicana/o Studies)
Beatriz Pesquera, Ph.D., Associate Professor (Chicana/o Studies)
Reugio I. Rochin, Professor (Chicana/o Studies, Agricultural Economics)
Adaliza Sosa-Riddell, Ph.D., Senior Lecturer (Chicana/o Studies)

The Major Program
The Chicana/Chicano Program offers an interdisciplinary curriculum which focuses 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 all analysis within the historical and contemporary experiences of Chicanas/os and Latinas/os in the Americas. The Chicana/Chicano Studies (Mexican-American) major gives students an opportunity to specialize within one of two emphases: a Humanities/Arts emphasis or a Social Sciences emphasis. Majors are expected to read, write, and speak Spanish at a level suitable for future study and work in Chicana/o and Latino/a settings. There are no language requirements for the minor. Minors must complete 24 units from courses specified below and must register for the minor at the Chicana/Chicano Studies Program Office. All Chicana/Chicano Studies courses are open to program minors and non-majors. Some upper division courses require prerequisites.

The Program. At the lower division level, the curriculum for the major provides an interdisciplinary overview of various topics. Students are advised to take lower division courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary coursework in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/Chicano history; theory, and method; and several courses taught from a variety of disciplinary perspectives. The upper division courses give majors the opportunity to specialize in one of two emphases for the B.A. degree. Each emphasis has a different focus and requires completion of different sets of courses. The Humanities emphasis integrates literature, culture, and artistic expression of both the humanities and social sciences and electives. The Social Sciences emphasis includes research methods, and a specialization in one of two areas: 1) community/political economy, and 2) identity and family/social issues.

Career Alternatives. The Humanities/Arts emphasis prepares students for professional work in cross-cultural education, cultural policy, cultural centers, and artistic expression and communications. The Social Sciences emphasis orient towards professional work in public education or community development, legal services assistance, health services, social welfare, and education. Both emphases in the major prepare students for advanced graduate and/or professional study in related fields.

Chicana/Chicano (Mexican-American) Studies

A.B. Major Requirements:

**Humanities/Arts Emphasis:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>16-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicana/o Studies</td>
<td>10</td>
</tr>
<tr>
<td>Chicana/o Studies</td>
<td>50</td>
</tr>
<tr>
<td>One course from Chicana/o Studies</td>
<td>21, 30, or 40</td>
</tr>
<tr>
<td>One course from Chicana/o Studies</td>
<td>60, 70, or 73</td>
</tr>
<tr>
<td>Spanish 1, 2, 3, or 7A, 7B, and 7C or the equivalent</td>
<td>4-12</td>
</tr>
</tbody>
</table>

**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Chicana/o Studies</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two courses from History 166B, 169A, or 169B</td>
<td>8</td>
</tr>
<tr>
<td>Two courses from Chicana/o Studies 110, 120, or 140</td>
<td>8</td>
</tr>
<tr>
<td>Comparative ethnic/gender: two upper division courses selected from 2 of the following areas</td>
<td>8</td>
</tr>
<tr>
<td>African-American Studies, Asian American Studies, Chicana/o Studies</td>
<td>24</td>
</tr>
<tr>
<td>Chicana/o Studies</td>
<td>130, 132, or 140</td>
</tr>
<tr>
<td>Chicana/o Studies</td>
<td>154, 160, or 171</td>
</tr>
<tr>
<td>Chicana/o Studies 111, 131, or Women’s Studies</td>
<td>4</td>
</tr>
</tbody>
</table>

**Minor Program Requirements:**

This minor provides the student with a broad overview of the status and experience of Chicanas/os and Latinas/os in society, and of the historical, social, political, economic, ideological and cultural forces that shape the Chicana/o experience. The minor requires students to attain an interdisciplinary perspective by including courses from two of the emphases. The minor is open to all students with or without coursework in Spanish.

**Minor in Chicana/o Studies (CHI)**

**Courses in Chicana/o Studies (CHI)**

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Chicana/o Studies</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicana/o Studies</td>
<td>50</td>
</tr>
<tr>
<td>One course from Chicana/o Studies 21, 30, or 40</td>
<td></td>
</tr>
<tr>
<td>One course from Chicana/o Studies 60, 70, or 73</td>
<td></td>
</tr>
<tr>
<td>Spanish 1, 2, 3, or 7A, 7B, and 7C or the equivalent</td>
<td></td>
</tr>
</tbody>
</table>

**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Chicana/o Studies</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two courses from History 166B, 169A, 169B</td>
<td></td>
</tr>
<tr>
<td>Two courses from Chicana/o Studies 110, 120, or 140</td>
<td></td>
</tr>
<tr>
<td>Comparative ethnic/gender: two upper division courses selected from 2 of the following areas</td>
<td></td>
</tr>
<tr>
<td>African-American Studies, Asian American Studies, Chicana/o Studies</td>
<td></td>
</tr>
<tr>
<td>Chicana/o Studies 111, 131, or Women’s Studies</td>
<td></td>
</tr>
<tr>
<td>Minor Adviser, R. Rochin</td>
<td></td>
</tr>
</tbody>
</table>

**Lower Division Courses**

<table>
<thead>
<tr>
<th>Chicana/o Studies (CHI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction to Chicana/o Studies (4)</td>
</tr>
<tr>
<td>The Staff</td>
</tr>
<tr>
<td>Lecture—3 hours; discussion—1 hour. Analyzes the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education, and related areas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chicana/o and Latin/o Health Care Issues (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture—3 hours; discussion—1 hour. Prerequisites: courses 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.</td>
</tr>
</tbody>
</table>
30. United States Political Institutions and Chicanas/os (4) II. The Staff
Lecture/discussion—3 hours; term paper. Overview of the major political institutions and ideologies of the United States and the Chicanas/os people's historical and contemporary experiences and their effects on, and responses to, them. Theory, methods and critical analysis.

40. Chicanas/os in the Economy (4) II. Rochin Lecture—4 hours. Introduction to Chicanas/os in the economy and related institutions. Topics include: political economy, immigration, education, labor markets, local economies, and government roles and policies in employment and income generation. General Education credit: Contemporary Society.

50. Chicanas and Chicano Culture (4) II, III. The Staff
Lecture—3 hours; discussion—1 hour. Interdisciplinary survey of Chicanas/o cultural representation in the 20th century. Examines Chicano 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.)

60. Chicanas and Chicano Representation in Cinema (4) II. Fregoso Lecture with film viewing—4 hours. Introductory level study of Chicanas and Chicano representation. Explores the depiction of Chicano and Chicana experience by Chicanas/os filmmakers, as well as by non-Chicanas/os, including independent filmmakers and the commercial industry. Offered in alternate years.

70. Survey of Chicanas/o Art (4) Montoya Lecture—4 hours. Survey of contemporary Chicanas/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.

73. Chicano/a Art Expression Through Silk Screen (4) I. Montoya Studio—4 hours; laboratory—4 hours. Introductory level studio course using silk screen and basic printmaking techniques to explore and develop images of Chicano/a cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicanas/o philosophy of art.

99. 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. Chicanas/Chicanos Theoretical Perspective (4) II. The Staff (Director in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 10 and 50. Critical examination of emerging Chicanas/Chicanos 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 Chicanas/os community.

110. Sociology of the Chicanas/Chicanos Experience (4) III. Pesquera Lecture/discussion—4 hours. Prerequisite: courses 10 or Sociology I. The Chicanas/Chicanos experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicanas/Chicanos labor into American class structure, education, inequality, ethnicity, the family, and Chicana/o politics. (Former course Sociology 110.)

111. Chicanas/Chicanos in Contemporary Society (4) II. Pesquera
Lecture/discussion—4 hours. Prerequisite: course 10 or 50, Women's Studies 50 or History 189B. Analysis of the role and status of Chicanas/Chicanas 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.)

120. Chicanas/Chicanos Psychology (4) III. Flores-Ortiz Lecture—4 hours—4 hours. Prerequisite: course 21, introductory psychology course recommended. Introduction to the field of Chicanas/o psychology. Analysis of socio-cultural context of Chicanas/os. Examination of issues of identity development, bilingualism, and development of self-esteem. Impact of minority experience, migration, acculturation are examined.

121. Chicanas/Chicanos Community Mental Health (4) I. Flores-Ortiz Lecture—3 hours; term paper. Prerequisite: course 10 or 20. Mental health needs, problems, and service utilization patterns of Chicanas/Chicanos will be analyzed. Applied service policy, and the economic context of mental health programs.

122. Psychology Perspectives Chicanas/o and Latina/o Family (4) II. Flores-Ortiz Lecture—4 hours. Prerequisite: course 10; introductory psychology course highly recommended, and consent of instructor. Role of migration and acculturation on family structure and functioning. From a psychological and Chicanas/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics: family violence, addiction, family resilience and coping strategies.

130. United States-Mexican Border Relations (4) III. Riddell Lecture—4 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.

131. Chicanas in Politics and Public Policy (4) II. Sosa-Ridell Lecture/discussion—4 hours. Prerequisite: course 30 or Political Science I. Historical and political analysis of Chicanas/Latinas political involvement and activities in the general public system, women's movement, Chicano movement, and Chicanas/o movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered in alternate years.

132. Political Economy of Chicanas/o Communities (4) III. Riddell Lecture—3 hours; term paper. Prerequisite: upper division standing. Lower division Chicanas/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicanas/o communities. Includes critical and Marxist theories and concepts applicable to Chicanas/os communities, case studies of Chicanas/o communities, especially in California and Texas. General Education credit: Contemporary Society.

140. Chicanas/o Ethnicity and Socio-Economic Inequalities (4) III. Rochin Lecture/discussion—4 hours. Prerequisite: upper division standing. Cross-sectional comparisons of socioeconomic inequalities facing ethnic minorities and, in particular, Chicanas/os in the economy. Sub-topics include theories and concepts for studying ethnicity and inequalities correlated with factors of demographics, immigration, education, labor markets, employment, occupations, housing and health.

154. The Chicanas/o Novel (4) II. Demersesian Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of Chicana/o literature. Special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana and Chicano/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A.)

155. Chicanas/o Theatre (4) III. Demersesian Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicanas/o theatre in the contemporary period with special emphasis on El Teatro Campesino and Chicanas/o Feminist Theatre. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 124B.)

156. Chicanas/o Poetry (4) III. Demersesian Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Survey of Chicanas/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 150C.)

171. Mexican and Chicano/a Rural Workshop (4) III. Montoya Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The rural, 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.

172. Chicanas/o Voice/Poster Silk Screen Workshop (4) II. Montoya Studio—8 hours; independent study—1 hour. Prerequisite: course 70 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 Chicanas/o artists' perspective.

192. Internship in Chicanas/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, or 50, or 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 for 12-unit maximum, P/NP grading only.

194A-HB-HC. Senior Honors Research Project (2-5) I, II, III. The Staff Independent study—6-15 hours. Prerequisite: senior standing in Chicanas/o Studies major. Student is required to do independent research, and write Honors Thesis on Chicanas/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)

---

Child Development

Child Development (A Graduate Group)

Roesmore Kraft, Ph.D., Chairperson of the Group
Office, 103 AOB (916-755-2192)

Faculty: Includes faculty members from the division of Human Development and the departments of Anthropology, Behavioral Biology, Education, Psychology, and the Schools of Law and Medicine.

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to a M.S. degree. The aim of the program is to provide students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and families in the community including the University's Early Childhood Laboratory. Recipients of the degree gain sufficient background in the biological and social sciences to engage in professional positions that directly (e.g., preschool) or indirectly (e.g., social policy) involve children and families. Further, they are trained to conduct research, write grants, and teach in both public and private settings.

Graduate applications must be submitted by May 1.

Graduate Advisor. Contact Group Office.
Chinese

See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

Chinese and Japanese

(College of Letters and Science)

Robert Borgen, Ph.D., Chairperson of the Department

Department Office Hours, 184 Kerr Hall (916-752-4985)

Faculty

Robert Borgen, Ph.D., Professor (Japanese)
Chia-ning Chang, Ph.D., Assistant Professor (Japanese)
Donald A. Gibbs, Ph.D., Associate Professor (Chinese)
Susan Griswold, Ph.D., Assistant Professor (Japanese)
Mau-siong Ng, Ph.D., Associate Professor (Chinese)
Michelle Yeh, Ph.D., Associate Professor (Chinese)

Emeriti Faculty

Key H. Kim, Ph.D., Professor Emeritus
Benjamin E. Wallack, Ph.D., Professor Emeritus

Related Courses. See East Asian Studies course listing.

The Major Program

The department serves the student in two ways: it offers a core language program in both Chinese and Japanese, and it offers courses in literature and cinema. The core language program is designed for students who have no background whatsoever in Japanese or Chinese. A separate program is designed for students who have 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 functional facility in the spoken language (hearing and speaking) and the written language (reading and writing). By this time, students will have begun to read authentic texts and to write short compositions. 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 Program sessions, the Education Abroad Program, or through internships.

Career Opportunities. UCD 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 7, 17, 27; or 8, 18, 28; and one 4-unit lower division Chinese language course.

Recommended: Japanese 10, Linguistics 1, History 9A

Depth Subject Matter: 38


Recommended: Japanese 101, 102, 103, 104, 105, 106; Anthropology 140A-148B; Art History 163A-163B; East Asian Studies 113; History 190A-190B-190C; 191A-191B; Religious Studies 172; or other advanced literature courses selected in consultation with the undergraduate adviser.

Total Units for the Chinese Major: 55/70

Japanese

A.B. Major Requirements:

Preparatory Subject Matter: 19/30

Japanese 1, 2, 3, 4, 5, 6, or 7, 16, 28

Recommended: Japanese 10, 15, 25, Chinese 10, Linguistics 1, History 98

Depth Subject Matter: 40

Japanese 101, 102, 103, 111, 112, 113, 139, 140, 156, 160, 211.

Recommended: Japanese 101, 105, 106, 107, 109-A-1, 110; Anthropology 140A-148B; Art History 164; Comparative Literature 153; History 194A-194B-194C; Religious Studies 172; or other advanced literature courses selected in consultation with the undergraduate adviser.

Total Units for the Japanese Major: 55/70

*See College procedures governing undergraduate enrollment in a graduate course.

The Minor Program

Minors are offered in Chinese and Japanese for students wishing to follow a formally recognized program of study in those languages and their literatures.

Minor Program Requirements:

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, Japanese 10, 15, 25) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of Chinese 111 or Japanese 111. For details, consult the undergraduate advisers.

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.

Student Advisers: C.N. Chang (Japanese), S. Grieswold (Japanese), M. Yeh (Chinese).

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.

Courses in Chinese (CHN)

Lower Division Courses:

1. Elementary Chinese (5). 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/N grading basis only. Although a passing grade will be charged to the student’s P/N grading option, all grades are recorded.

1A. Intensive Elementary Modern Chinese (10). 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 go on to course 3.

2. Elementary Chinese (5). The Staff

Lecture/discussion—5 hours. Prerequisite: course 1. Completion of course 1 in the areas of grammar and basic language skills.

3. Elementary Chinese (5). The Staff

Lecture/discussion—5 hours. Prerequisite: course 2. Completion of course 2. Completion of course 1 and 2 is required for all students wishing to continue on to course 3.

3A. Situational Chinese (2). The Staff

Discussion—2 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.

4. Intermediate Chinese (5). 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). 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). 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). The Staff

Discussion—2 hours. Prerequisite: course 6 (may be taken concurrently) Instructor and students create a specific social situation and establish roles for students/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.

7. Mandarin for Cantonese Speakers I (5). 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 system known as pinyin, for students who already can read and write Chinese. Course assumes no knowledge of spoken Mandarin Chinese.

8. Accelerated Written Chinese I (5). The Staff

Lecture—6 hours. Prerequisite: knowledge of spoken Mandarin Chinese. Designed for students who already have some degree of fluency in spoken Mandarin, but who cannot read Chinese characters. This course provides an opportunity for students to develop reading ability and to accelerate their progress to the upper division.

10. Modern Chinese Literature (in English) (4). The Staff

Lecture—3 hours; discussion—1 hour. Introductory course requiring no knowledge of Chinese language or literature. Reading and discussion of short stories, novels, and novels of China's current culture. Introduction to the cultural and political ramifications of modern Chinese literature.

11. Great Books of China (in English) (4). Ng

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. General Education credit: Civilization and Culture.

17. Mandarin for Cantonese Speakers II (5). The Staff

Lecture—5 hours. Prerequisite: course 7. Continuation of course 7. Training in spoken Mandarin for students who already can read and write Chinese.

*Course not offered this academic year.
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 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.)

108A-1. Topics in Chinese Literature (in English) (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: dependent 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 scholar in the Song period; (F) the literature of the Song period; (G) the literature of the twelfth-century Taiping revolution; (H) popular literature; (I) the scholar and the courtier. Offered in alternate years.

110. Great Writers of China: Texts and Context (in English) (4) II. Yeh
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. General Education credit: Civilization and Culture.

111. Modern Chinese: Reading and Discussion (4) I, Ng
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Readings in modern Chinese newspapers, 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 newspapers, 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 newspapers, essays, and short stories, based on language skills developed in course 112.

114. Introduction to Classical Chinese: Confucius (4) I. Gibbs
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Texts from the Confucian canon and related commentary to provide a foundation for understanding the Chinese language, culture, and intellectual history.

115. Introduction to Classical Chinese: Mencius (4) II. Ng
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the Records and Hsiao Tung of the Grand Historian and other early, influential works.

120. Advanced Chinese (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from classical texts, developing advanced skills in reading, writing, aural comprehension, and translation.

130. Readings in Traditional Chinese Fiction (4) II. Ng
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.

131. Readings in Traditional Chinese Poetry (4) I. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or the equivalent; course 114 recommended. Close reading in Chinese of representative works from the Tang Dynasty to modern times. May be repeated once for credit.

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 late Qing and Republican period; surveying major innovations and their impact on the language of Chinese poetry.

140. Readings in Classical Chinese (4) I, II. 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.

*Course not offered this academic year.

160. The Chinese Language (4) II. 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. The Staff
Internship—5-36 hours to be arranged. Prerequisite: upper division coursework in Chinese with department consent. Work experience in the Chinese language with an analytical term paper on a topic approved by the instructor. (P/N grading only.)

197T. Tutoring in Chinese (1-5) I, II. The Staff
Tutoring—1-5 hours. Prerequisite: consent of Program 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/N grading only.)

198. Directed Group Study (1-5) I, II. The Staff
Directed Group Study—1-5 hours. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II. The Staff
Directed Group Study—1-5 hours. (P/N grading only.)

Graduate Course

295. Research (1-12) I, II. The Staff
Research—1-12 hours. (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/N grading basis only. Although a passing grade will be charged to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Advanced Japanese (5) I, II. The Staff
Lecture—5 hours. Prerequisite: course 5 or the equivalent. Continuation of instruction 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.
Courses in Greek (GRK)

**Lower Division Courses**

1. Elementary Greek (5) I. The Staff
   Lecture—1 hour. Prerequisite: course 2 or 4. 3 credits.

2. Elementary New Testament Greek (5) I. The Staff
   Lecture—1 hour. Prerequisite: course 6. 3 credits.

3. Intermediate Greek (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 2. 3 credits.

4. Intermediate New Testament Greek (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 4. 3 credits.

5. Theology of New Testament (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 6. 3 credits.

6. Greek and Roman Comedy (4) I. The Staff
   Lecture—3 hours. Prerequisite: course 1. 3 credits.

7. Greek Tragedy (4) I. The Staff
   Lecture—3 hours. Prerequisite: course 1. 3 credits.

8. Ancient Greek History (4) I. The Staff
   Lecture—3 hours. Prerequisite: course 2. 3 credits.

9. Topography and Monuments of Ancient Athens (4) I. The Staff
   Lecture—3 hours. Prerequisite: course 1. 3 credits.

10. Ancient Greek Grammar (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

11. Ancient Greek Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

12. Greek and Latin Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

13. Latin and Greek (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

14. Greek and Latin Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

15. Topography and Monuments of Ancient Athens (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

16. Ancient Greek History (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

17. Ancient Greek Grammar (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

18. Ancient Greek Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

19. Topography and Monuments of Ancient Athens (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

20. Ancient Greek History (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

21. Ancient Greek Grammar (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

22. Ancient Greek Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

23. Topography and Monuments of Ancient Athens (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

24. Ancient Greek History (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

25. Ancient Greek Grammar (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

26. Ancient Greek Literature (4) I. The Staff
    Lecture—3 hours. Prerequisite: course 2. 3 credits.

Courses in Latin (LAT)

**Lower Division Courses**

1. Elementary Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 1. 3 credits.

2. Intermediate Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 2. 3 credits.

3. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

4. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

5. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

6. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

7. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

8. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

9. Advanced Latin (5) I. The Staff
   Lecture—5 hours. Prerequisite: course 3. 3 credits.

10. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

11. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

12. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

13. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

14. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

15. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

16. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

17. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

18. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

19. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

20. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

21. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

22. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

23. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

24. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

25. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

26. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

27. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

28. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

29. Advanced Latin (5) I. The Staff
    Lecture—5 hours. Prerequisite: course 3. 3 credits.

*Course not offered this academic year.*
Clinical Nutrition and Metabolism
See Internal Medicine in Medicine, School of

---

Clinical Pathology
(School of Veterinary Medicine)
Jiro J. Kaneko, D.V.M., Ph.D., Acting Chairperson of the Department
Department Office, 1319 Harum Hall (916-752-2153)
Faculty
Neri C. Jain, M.V.Sc., Ph.D., Professor
Joseph G. Zink, D.V.M., Ph.D., Professor
Part-Time Clinical Faculty
Robert M. DuFort, D.V.M., Assistant Clinical Professor
Sonia M. Shelly, D.V.M., Assistant Clinical Professor
John W. Switzer, D.V.M., Associate Clinical Professor
Emeriti Faculty
Bernard F. Feldman, D.V.M., Ph.D., Professor
Emile Donahue, D.V.M., Ph.D., Professor Emeritus
Jiro J. Kaneko, D.V.M., Ph.D., Professor Emeritus

Courses in Clinical Pathology (CLP)
Upper Division Courses
101. Comparative Hematology (2) I. Kaneko, Jain, Zink
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. Kaneko, Zink, Jain
Laboratory—4 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. Kaneko
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.
199. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(PNP grading only.)

Graduate Courses
204. Normal and Abnormal Bone Marrow Cytology (1) III. Zink
Lecture—laboratory—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of bone and blood marrow in selected diseases of domestic animals, including infections, anemias, myeloproliferative disorders and leukemias.
205. Physiology and Pathology of Leukocytes (2) III. Jain
Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, genetics, homeostasis, cytochemistry, and functions of different leukocytes; physiologic, functional, histologic, and morphologic changes in leukocytes in diseases; their role in inflammatory and immunologic processes. Offered in alternate years.
206. Immunohematology (2) III. Jain, MacKenzie (Medicine)
Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 126, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematology; diseases; reactions to blood transfusions; transplantation mechanics. Offered in alternate years.
299. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
299. Research in Clinical Pathology (1-12) I, II, III. The Staff
(SU grading only.)

---

Clinical Psychology
See Medicine, School of

Communication
See Rhetoric and Communication

Community Development
(An Graduate Group)
Desmond Jolly, Chairperson of the Grad Group
Office, 1333 Hart Hall (Applied Behavioral Sciences). (916-752-1926)
Faculty. The interdisciplinary faculty include those in Anthropology, Asian American Studies, African American Studies, Landscape Architecture, Environmental Design, Geography, Psychology, Sociology, and Women's Studies.
Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program is designed to prepare students for professional roles as administrators, designers, planners, researchers, or technicians with emphasis upon rural, non-metropolitan communities and human service organizations. Training in community development is also aimed at preparing individuals to work within government or non-profit organizations in the realm of social and economic change. There is opportunity available for specialization in: (1) community design and planning, (2) ethnic and cultural diversity, (3) women's issues in the community, (4) community health and human services, (5) environmental issues, (6) rural and agricultural issues, and (7) community economic development.

B.S. Major Requirements:
(For convenience in program planning, the typical course taken to satisfy the requirements are shown in parenthesis. Equal to or greater comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

English Composition Requirement .............................................. 0-8
See College requirement
Preparatory Subject Matter ......................................................... 49-50
Biological sciences (Biology 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, Sociology 3) ................. 4
Social research methods (Sociology 46A or Psychology 41) ........................ 4
Statistics (Sociology 46B or Statistics 13) ............................................ 4
Breadth/General Education ......................................................... 6-24
Satisfaction of General Education requirement ................................... 6-24
(To note some of the Option Subject Matter may meet General Education requirements.)

Depth Subject Matter ......................................................... 0-52
Biological Sciences 102 and 103 ................................................... 6

*Course not offered this academic year.

Preparation. Applicants to this program can prepare for 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
(Colors of Agricultural and Environmental Sciences)

The Major Program
Community nutrition teaches 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 designed 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 major subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the advisor.
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 typical course taken to satisfy the requirements are shown in parenthesis. Equal to or greater comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

English Composition Requirement .............................................. 0-8
See College requirement
Preparatory Subject Matter ......................................................... 49-50
Biological sciences (Biology 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, Sociology 3) ................. 4
Social research methods (Sociology 46A or Psychology 41) ........................ 4
Statistics (Sociology 46B or Statistics 13) ............................................ 4
Breadth/General Education ......................................................... 6-24
Satisfaction of General Education requirement ................................... 6-24
(To note some of the Option Subject Matter may meet General Education requirements.)

Depth Subject Matter ......................................................... 0-52
Biological Sciences 102 and 103 ................................................... 6

*Course not offered this academic year.
Consumer Economics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agricultural Economics.

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Studies section in this catalog.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics (CNE)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, Advising Office, University House Annex.

Upper Division Courses

142. Personal Finance (3) I. Shepard; II. B. Butler; summer

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. (Same course as Agricultural Economics 109.)

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 (1) I, II, III. The Staff

Seminar—1 hour. Current issues in consumer economics and the economics of consumption.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) 

(S/U grading only.)

Consumer Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Division of Textiles and Clothing.

Major Programs and Graduate Study. Consumer Food Science is a related major. For graduate study, see the Graduate Studies section in this catalog.

See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science (CNS)

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising Office, 123 Everson Hall.

Lower Division Courses

*47. Food Product Development Field Study (1) III. Schutz Discussion—three 2-hour sessions; field trip—2 days. To observe commercial aspects of the large-scale development, distribution, and evaluation of food products intended for human consumption. Course given between Winter and Spring Quarters. Advance enrollment with instructor required Winter Quarter. (P/NP grading only.)

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) I. 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 model to help guide and understand consumer research will be presented. General Education credit: Contemporary Societies.

*135. Principles of Food Product Development (3) I. Schutz Lecture—3 hours. Prerequisite: one course in introductory food science. Presents basic concepts of product research and development. Organization, activities, new product development, project management, role of food regulations, consumerism, marketing, advertising, consumer research.

192. Internship in Consumer Science (1-12) I, II, III. Rucker Internship—3-36 hours. Prerequisite: completion of a minimum of 64 units; consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

196. 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 Courses

230. Consumer Research Methods (3) II. Schutz Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Topics will include consumer laboratory and field attitude research, consumer sampling, measurement techniques, scales and methods of analysis.

296. Research (1-12) I, II, III. Rucker (S/U grading only.)

*Course not offered this academic year.

Critical Theory

See Applied Biological Systems Technology (under Biological and Agricultural Engineering)

Critical Theory

Marc E. Blanchard, Agrégé de Lettres, Program Director (916-752-4787)

Program Office, 516 Sproul Hall, (916-752-5464)

Committee in Charge

Emily Aptor, Ph.D. (French)
Phil Barrish, Ph.D. (English)
Marc E. Blanchard, Ph.D. (French, Critical Theory)
Angie Chabram, Ph.D. (Chicana Studies)
M. Kay Flavell, Ph.D. (Humanities Program, Critical Theory)

Smedar Ljubis, Ph.D. (Anthropology, Critical Theory)
Harriet Muray, Ph.D. (Religion)
Int Rogoff, Ph.D. (Art, Critical Theory)
Juliana Schiesari, Ph.D. (Italian)
Michael Smith, Ph.D. (Applied Behavioral Sciences)
George Van Den Abbeele, Ph.D. (French)

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 the eleven participating departments (Anthropology, Comparative Literature, English, French and Italian, German and Russian, History, Music, Philosophy, Psychology, Sociology, and Spanish; other departments are in the process of joining). 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 (2004, 2008) offered by the program in Critical Theory, two additional graduate courses (one of 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. The Staff

Lecture/discussion—4 hours. Prerequisite: graduate standing in a participating program. Investigation into research problems of Critical Theory and a critical examination of various theoretical approaches (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis) in an interdisciplinary perspective.

200B. Problems in Critical Theory (4) I, II, III. The Staff

Seminar—3 hours; term paper. Prerequisite: course 200A with a grade of B+ or better. Practical application of critical theoretical perspectives to a common problem defined in interdisciplinary terms. Topics will vary.

201. Critical Theory Special Topics (4) I, II, III. The Staff

Seminar—3 hours; term paper. Prerequisite: course 200A. Application of theoretical principles to one specific research topic.

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.)
Dermatology
See Medicine, School of

Design
(College of Agricultural and Environmental Sciences)
Faculty. See under the Department of Environmental Design.

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 creativity, not only in design work but also in planning the overall undergraduate education.

The Program. Basic introductory design courses such as introduction to design, drawing, and media are required of all design majors. Beyond these, students take specialized courses in their area of interest. A student who emphasizes costume design, for example, might have a study plan that includes courses in fashion design, personal adornment, history of costume design, and the upper division studio course design series. Textile design students take courses in hand-construction, layered, and loomed textiles, as well as the printed textile design series. Environmental design is an area that includes courses in drafting and perspective, exhibit design, furniture design, and the two-year studio interior design series. These areas are strongly complemented by classes in related design history.

Portfolio. Students will be 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.

Internships and Career Alternatives. As part of their preparation, design students are encouraged to be involved in internships in design firms, museums, art galleries, textile galleries, and in interior designers' and architects' offices. Design graduates have gone directly from this program into retail clothing and interior design and architectural firms, exhibit and display work in galleries and museums, and theatrical and textile companies. In addition, students also create their own jobs through freelance and commission work in many related areas.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>UNITs</th>
<th>ENGLISH COMPOSITION REQUIREMENT</th>
<th>0-8</th>
<th>SEE COLLEGE REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PREPARATORY SUBJECT MATTER</td>
<td>32-34</td>
<td>Art (one course from Art History 1A, 1B, 1C or 1D)</td>
</tr>
<tr>
<td></td>
<td>Design (Design 1, 2, 3, 11, 12, 13)</td>
<td>21</td>
<td>Other (two courses from American Studies 10, Anthropology 2, Geology 2, Psychology 1, Sociology 1, 25, Rhetoric and Communication 1, 3)</td>
</tr>
</tbody>
</table>

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. The Staff Studio—8 hours; one or two field trips. Prerequisite: courses 11, 12. Contemporary approach to textile techniques of construction such as netting, plaiting, knotting and basketry.

25. Reproduction Graphics (4) II. The Staff Studio—8 hours; field trip. Prerequisite: courses 11 or 12, and 13. Basic studio and photographic skills for the designer; continuous tone, line and halftone films, mechanical and four-color screen separations.

77A. Soft Product Development (4) II. The Staff Studio—8 hours. Prerequisite: course 11 or 12. 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) II. 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. (PPNP grading only.)

Upper Division Courses

121. Design Delination (4) II. Olsen and staff Studio—8 hours; field trip. Prerequisite: courses 11, 12, 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. Lacy Studio—8 hours; field trip. Prerequisite: course 23 or 24. Art and science of hand building structures in flexible materials. Studio projects in experimental twotwo- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

125. Textiles in the Landscape (4) III. Shawcroft Lecture—2 hours; studio—5 hours. Prerequisite: courses 22, 24. Exploring the role that textiles play in urban and natural environments, working with the symbiotic relationship of these textiles and their immediate placement in the outdoor landscape.

128A. Visual Presentation: Visual Merchandising (4) I. Goff Studio—8 hours; field trips. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. Study of two-dimensional objects in a spatial context with an emphasis on visual merchandising.

128B. Visual Presentation: Exhibition Design (4) II. Goff Studio—8 hours; field trips. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. Study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

131. Layered Textiles (4) IV. Rivers Studio—8 hours; one or two field trips. Prerequisite: background in drawing, personal adornment and non-woven textiles recommended. Exploration of multi-layered and multi-dimensional textiles: applique, patchwork, quilting, stump work. The individualized influences of materials and techniques on contemporary textiles.

132A. Loom-constructed Textile Design (4) I. Shawcroft Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and
144. History of Interior Design (4) II. The Staff (Stabb in charge) 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 history of its influence on the development of the theory of modern interior design.

180A-180B-180C. Textile Design (4-4-4) I, II, III. Rivers and staff (Stabb in charge) Studio—8 hours; one or two field trips. Prerequisite: courses 11 and 12 recommended. Exploration of the design and appreciation of hand printed textiles; emphasis on the unique qualities of the individual as producer.

170A-170B-170C. Costume Design (4-4-4) I-II-III. Stabb Studio—8 hours; field trip. Prerequisite: course 77B. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historical, contemporary, and projected image of man as expressed through costume.

180. Advanced Interior Architecture (4) I. Olsen, Berteaux Studio—8 hours; field trip. Prerequisite: course 180. 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. The Staff (Stabb in charge) 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) I. Berteaux Studio—8 hours; field trip. Prerequisite: course 180B. Design of a complex facility, including the integration of interior design, building structure and building systems.

190. Proseminar (1) I. The Staff Seminar—1 hour. Prerequisite: design major or consent of instructor. Exposition of interior design history through presentation and discussion 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 11, 12; 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.)

197. 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.)

Dietetics

The Major Program

The dietetics major provides students with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, and 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 nutrition science majors, but in dietetics there is less emphasis on laboratory aspects of the science courses. Instead, dietetics majors take additional courses such as education, sociology, communication skills, and food service management to prepare for work in the public. Dietetics students spend the first two years completing preparatory coursework 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.

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.

English Composition Requirement

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
</tr>
</tbody>
</table>
Dramatic Art

(College of Letters and Science)

Robert A. Fathmer, Ph.D., Chairperson of the Department
Department Office, 222 Dramatic Art Building
(916-752-0388)

Faculty
Elizabeth Canin, M.F.A., Assistant Professor
Robert A. Fathmer, Ph.D., Professor
Harry C. Johnson, M.A., Professor
Jeffrey Hunt, M.F.A., Assistant Professor
William E. Kleb, D.F.A., Professor
Phyllis J. Kress, M.F.A., Lecturer
Barbara Sallans-Younk, Ph.D., Assistant Professor
Darrell F. Winn, M.A., Lecture

Emeriti Faculty
Ruby Cohn, Ph.D., Professor Emeritus
Evanard d’Harmoncourt, Ph.D., Professor Emeritus
Robert K. Saridis, Ph.D., Professor Emeritus
Daniel E. Snyder, Professor Emeritus
Alan A. Stambusky, Ph.D., Professor Emeritus

The Major Program

The Department of Dramatic Art offers students an opportunity to develop their talents and abilities through a broad spectrum of courses combining both artistic and scholarly skills. The dramatic artist is exposed to every phase of theatre: the performing areas such as acting, directing, design, and playwriting, technical practice involving construction and coordination of sets, costumes, and lights, and a firm grounding in theatre history, dramatic literature, and criticism.

Productions and Facilities. Productions each year are separated into three "seasons." The University Theatre Season consists of five major productions of established plays. Five smaller productions of new, student-written plays from Premiere Season, while Studio Season offers three smaller productions of established plays. Also included in the production program are the major presentation of an experimental piece and many class-related projects.

Guest Artists. The department's Granada Artists-in-Residence program brings distinguished British theatre artists to the department each quarter to teach and direct.

Career Alternatives. The various skills involved in a broad theatre education open doors to many career possibilities. Arts management is a relatively new area calling for people with artistic training. Designers and technicians find career opportunities in community theatres, amusement parks, museums, lighting firms, the fashion industry, and advertising. Training in acting helps those interested in pursuing law, business, public relations, or public office. And there are always those few who— with talent and luck—succeed as actors, directors, or designers for stage, film, or television.

A.B. Major Requirements:

Preparatory Subject Matter..........................22
Dramatic Art 20, 21A, 24, 25..........................14
Dramatic Art 21B or 27.................................3-4
Additional units to achieve a total of 22 lower division units in Dramatic Art..................4-5

Depth Subject Matter.................................40
Dramatic Art 124A or 124B, 124D or 124D, 127A, 127B or 160A, 156, 158, 158, 158, 160A..........................36
A minimum of four units from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 126, 150, 153, 153; or with the adviser's consent, from appropriate literature courses in language and literature departments..........................4

Additional Requirements

During the undergraduate career majors are to participate in at least eight dramatic productions (exclusive of class-room projects). Participation must include work in acting, scene construction, costume construction, lighting, and stage managing or directing. Majors are also expected to attend theatre performances.

Total Units for the Major...........................82

Minor Program Requirements:

Preparatory Subject Matter..........................20
Dramatic Art 124A, 160A, 186, 157 or 158, 159..........................20
Minor Adviser. E. Canin, H. Johnson.
Transfer Students. If you are a transfer student you should see the major adviser for an evaluation of your experience.

Teaching Credential Subject/Representative. E. Canin. See also the Teacher Education Program.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. (acting, directing, design, or play writing), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. E. Canin.

Courses in Dramatic Art (DRA)

Lower Division Courses

10. Introduction to Acting...........................211A, 111. The Staff
Laboratory/discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatrical productions. Intended for students not specializing in acting. 

15. The Art of the Cinema (C)...........................211A
The Staff Lecture—2 hours; discussion—1 hour; film viewing—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.

18L. Introduction to Filmmaking..........................211A
The Staff Lecture/discussion—3 hours; film viewing—2 hours. Prerequisite: course 15 concurrently or consent of instructor. Students in small groups will write, shoot, and edit 8 mm films, and prepare sound tracks for them.

19. Introduction to Dramatic Art (4) II, III. Volk
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.

21A. Fundamentals of Acting (4) II. Sellers-Young
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

21B. Fundamentals of Acting (4) III. Sellers-Young
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) III. 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 Art (2) II. Winn
Lecture—1 hour; laboratory—2 hours. Understanding and appreciation of the technical principles of dramatic production; basic tools and materials, principles of scene construction: scene painting, costume construction, stage rigging, lighting and sound equipment, and control systems.

27. Fundamentals of Playwriting and Directing (3) I. Kleb
Discussion—2 hours; workshop—2 hours; reading of selected texts in the theory of directing and playwriting. Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaboration of playwright and director.

30. Theatre Laboratory (1-5) I, II, III. The Staff
Prerequisite: core course 25 or consent of instructor. Projects in acting, production, scene design, costume, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

98. Directed Group Study (1-5) I, II, III. The Staff
Lecture (Chairperson in charge)
Privately for lower division students. (P/NP grading only).

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Lecture (Chairperson in charge)
(P/NP grading only).

Upper Division Courses

115. Advanced Study of Major Film Makers (4) II. The Staff
Lecture/discussion—2 hours; film viewing—2 hours. Prerequisite: course 21A. 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 creators studied.

121A. Advanced Acting (4) I. Johnson
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

121B. Advanced Acting II. Johnson
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems

*Course not offered this academic year.
and the maximization of individual resources.

124A. Principles of Theatrical Design: Scenery (4) I. J. Hunt 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) II. J. Hunt 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) II. J. Hinn 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. J. Hinn Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costume, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.

126. Production Management (3) I. J. Hinn Lecture—3 hours. Prerequisite: course 25. Theoretical study and practical experience in production planning and management, application of design tools and techniques to the preparation of production budgets, and the consequences of financial decision-making.

127A. Principles of Directing (4) I. The Staff Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. Creative interpretation of the text and its staging.

127B. Principles of Directing (4) II. The Staff 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.

150. American Theatre and Drama (4) I. J. Hinn Lecture—4 hours. History and development of the American theatre, discussed in theater and historical context. Offered in alternate years.

153. The American Musical (4) III. J. Hinn Lecture—4 hours. History and development of the American Musical, discussed in theatrical and historical context. Offered in alternate years.

154. Asian Theatre and Drama: Contexts and Forms (4) II. S. Young Lecture-discussion—4 hours. Prerequisite: course 24 or consent of instructor. Theories of gesture, performance, and cultural context in Asian and Western traditions.

155. Black Theatre and Drama (4) III. J. Hinn Lecture—4 hours. History and development of African American theatre, discussed in social and historical context. Offered in alternating years.

156. Theatre and Drama: Aeschylus to Machiavelli (4) I. The Staff Lecture—4 hours. Selected plays and the history of the theatre in ancient Greece through the Italian Renaissance. General Education credit: Civilization and Culture.

157. Theatre and Drama: Shakespeare to Schiller (4) II. The Staff Lecture—4 hours. Selected plays and the history of the theatre in ancient Greece through the Italian Renaissance and the Renaissance. General Education credit: Civilization and Culture.

158. Theatre and Drama: Ibsen to Albee (4) III. J. Hinn Lecture—4 hours. Selected plays and the history of the theatre from The English Renaissance to the present.

159. Contemporary Experimental Theatre and Drama (4) I. J. Hinn Lecture—4 hours. Examination and evaluation of selected modern and contemporary plays, discussed in social and historical context. Offered in alternate years.

160A-160B. Principles of Playwriting (4-4) I. J. Hinn Lecture/seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Writing, reading, and analyzing plays and stage directions. Preparation of scenarios, composition of plays.

180. Theatre Laboratory (1-5) I, II, III. The Staff Lecture—5 hours. Prerequisite: upper division standing and consent of instructor. Projects in acting, production, scene design, costume design, 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—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.)

194A-194B. Special Study for Honors Students (3-3) I, II, III. The Staff Independent study—8 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Drama Art Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of the instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence.)

197. Touring in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge) Touring—1-6 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. Research methods and literary and historical context in the study of theatre. Offered in alternate years.

211. Advanced Voice and Speech (2) I, II, III. Carlin Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Voice production and speech associated with specific acting problems in classical and modern plays. 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. Movement patterns relating to acting problems in classical and modern plays. May be repeated for credit.

213. Special Problems in Advanced Acting (4) I, II, III. Johnson, Carlin, Sellers-Young Seminar—2-4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

224A. Visual Problems in Theatre and Performance (4) I. The Staff Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to
circumstances under which they were produced. Offered in alternate years.

*259. Contemporary Theatre (4) I. The Staff Seminar—3 hours; term paper. Selected aspects of contemporary Western theatre, with attention to their models of production.


265. Theory of Dramatic Art (4) II. Kib Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in alternate years.

280. Theatre Laboratory (1-12) II, II, III. The Staff Advanced practice in acting, directing, design, playwriting, and technical theatre. May be repeated for credit.

295. 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) (SU grading only)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Professional Course

413. Stage Make-up (1) I. 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.

 garner

Earth Sciences and Resources (A Graduate Group)

Students admitted into the Earth Sciences and Resources Graduate Group before June 30, 1990 will be allowed to complete their degree in the subject. New students however, should see the Hydrologic Sciences Graduate Group section in this catalog.

Information, 113 Vollmeyer Hall (916-752-3140/0453).

East Asian Studies (College of Letters and Science)

Michelle Yeh, Ph.D., Program Director
Program Office, Interdepartmental Programs (916-752-1219)

Faculty

Robert Borgen, Ph.D. Professor (Chinese and Japanese)
Chia-ning Chang, Ph.D. Assistant Professor (Chinese and Japanese)
Mary H. Feng, PhD, Professor (Art History)
Donald Gibbs, Ph.D., Associate Professor (Chinese and Japanese)
Susan Grinsdell, Ph.D., Assistant Professor (Chinese and Japanese)
Gary G. Hamilton, Ph.D., Professor (Sociology)
Joyce K. Kallgren, Ph.D., Professor (Political Science)
Whalen L. Lau, Ph.D. Professor (Religious Studies)
Kwong-chung Liu, Ph.D., Professor (History)
Susan Mann, Ph.D., Professor (History)
Mau-sang Ng, Ph.D., Associate Professor (Chinese and Japanese)
Don C. Price, Ph.D., Professor (History)
G. William Skinner, Ph.D. Professor (Anthropology)

Janet S. Smith, Ph.D., Associate Professor (Anthropology)
Marten Uy, Ph.D., Professor (Comparative Literature)
Michelle Yeh, Ph.D., Associate Professor (Chinese and Japanese)

Emeritus Faculty

Benjamin Wallacker, Ph.D., Professor Emeritus

The Major Program

The East Asian studies major is designed to give 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 Studies, languages, and cultures. After taking the core courses in conjunction with two years or more of either Chinese or Japanese language study, the student chooses additional courses in one or more special fields of interest, such as anthropology, history, economics, and sociology.

Career Alternatives. The program prepares students for a career in working with East Asia affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate study in East Asia.

A.B. Major Requirements:

- Preparatory Subject Matter
- History
- Anthropology
- Economics

- Social Science
- Anthropology
- Geography
- Political Science
- Sociology

- Humanities
- Art History
- Chinese Literature
- Japanese Studies

At least 12 additional units must be selected from the above courses, or from the following: Anthropology 110, 111, 112, 120, 122, 123, 124, 125; Chinese (any upper division course): Economics 115A, 115B, 116, 160A, 160B, 162, Geography 143, History 102G, 102H, 102N, 191A, 191B, 194D; 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.)

Total Units for the Major: 77-78

Recommended

Students are strongly urged to take a substantial number of courses in one or more of the following areas: history, social science, and humanities. Core courses in each category are listed below.

History:
- History 102A-102B or 102A-102C; History 109A, 109B, 109C
- History 109A, 109B, 109C
- History 202A-202B or 202A-202C
- History 202A-202B or 202A-202C

Social Science:
- Anthropology 148A, 148B, 149A, 149B
- Economics 171
- Geography 127
- Political Science 148A, 148B
- Sociology 147

Humanities:
- Art History 103A, 103B, 103C, 104
- Chinese Literature
- Japanese Literature
- Religious Studies

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 program, 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.

East Asian Studies

History 9A and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9B and 18 upper division units, of which at least 12 must be in courses focusing on Japan.

Major Advisers. Consult Program Director.

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
- 149A, Traditional Chinese Society
- 149B, Family, Gender, and Population in Contemporary China
- 149C, Traditional Japanese Society
- 149D, Contemporary Japanese Society

Art History
- 101, 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
- 127, Contemporary East Asia

Geography
- 102, History of East Asia

History
- 9A, History of East Asia

Political Science
- 133, The Political Role in East Asia

Religious Studies
- 70, Introduction to Buddhism
- 75, Chinese Philosophy: An Introduction

*Course not offered this academic year.
Courses in Ecology (ECL)

Graduate Courses

200A. Principles and Application of Ecological Theory (4). For advanced students.
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; and to concepts of evolution.

200B. Principles and Application of Ecological Theory (4). Fall
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A. Continuation of course 200A. Critical evaluation of land use and population 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). Ustin/Dawson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and 200B. Overview of ecosystem and landscape models. Use of contemporary research 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.

202. Techniques in Spatial Analysis (4). I. Ustin
Lecture—2 hours; laboratory—4 hours; term paper. Prerequisite: course 200A, 200B, and 201. Spatial measurements and analytical techniques. Types and uses of satellite, aircraft, and other remotely sensed images for ecosystem and process studies. Techniques for multispectral image analysis and geographic information systems and applications to ecosystem research.

203. Physiological Ecology of Animals (3). II. Ellers (Zoology), Cech (Wildlife and Fisheries Biology)
Lecture—2 hours; discussion—1 hour. Prerequisite: Zoology 125. Physiology 110 or the equivalent; elementary calculus. Comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecosystem of the animal group.

204. Population and Community Ecology (4). I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125, Mathematics 21A-C or equivalent. Prerequisites: course 203. Advanced seminar in population ecology using selected readings, problems, and fieldwork; structure emphasizing research projects in animal and plant communities.

205. Structure of Ecological Communities (4). II. Quinn (Environmental Studies)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125 or Botany 117, Genetics 102 or Botany 100 or Zoology 148, and Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced undergraduates an introduction to the basic principles of community ecology, processes of community formation, and the factors influencing species distribution.

206. Concepts and Methods in Plant Community Ecology (4). I. Rejmanek (Botany), Barbour (Botany), Menke (Agronomy)
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 community organization. Most techniques are demonstrated or conducted during field trips and laboratories. Offered in alternate years.

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 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. Harrison
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100, Zoology 125, Botany 117, Environmental Studies 108. Graduate introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty. Offered in alternate years.

209. Demography for Biologists (3). II. Carey
Lecture—3 hours. Prerequisite: course 104 or Zoology 125 or the equivalent. Major demographic concepts and techniques, including age structure, population growth, age-dependent population processes, taxonomy, and biogeography of age structures. Examination of age structures of various species and how age structures relate to population processes and age-dependent life histories. Offered in alternate years.

210. Advanced Topics in Human Ecology (4). III. Orlove (Environmental Studies)
Lecture—2 hours; discussion—2 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 Analysis (4). III. Sabatier
Lecture—2 hours; discussion—1 hour; seminar paper. Prerequisite: course 204 or equivalent (e.g. Political Science 107 or 108); course in bureaucratic policy making (e.g., Environmental Studies 166 or Political Science 181); course in intermediate statistics (e.g., Sociology 108 or Economics 108). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in alternate years. (Same course as Environmental Studies 212A.)

212B. Environmental Policy Analysis: Evaluation (4). I. Schwartz (Environmental Studies)
Lecture—1 hour; discussion—1 hour—seminar—2 hours. Independent evaluation project. Prerequisite: Economics 100 or the equivalent; Environmental Studies 168A (or the equivalent course in policy analysis or resource economics); intermediate level economics (e.g., Sociology 108 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs and plans. Ex-ante and ex-post evaluation will be studied. Offered in alternate years. (Same course as Environmental Studies 212B.)

Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Major trends in population dynamics, resource scarcity and environmental problems, and social structure; focus on demo-
graphic 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) L. Schonewald-Cox
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 applied methods and analysis of specific sites. Offered in alternate years.

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) equations and comparative methods emphasized as techniques for developing empirical ecological theories. Offered in alternate years.

221. Chemical Aspects of Ecology (3).
Lecture—3 hours; laboratory—2 hours. Prerequisite: Chemistry 1A-1B, Chemistry 2A-2B, or equivalent. An introduction to the chemistry of the composition, transformation, movement, and action of chemicals and organisms in ecological systems. Emphasis is placed on the ecological consequences of the chemistry of life. Offered in alternate years.

232. Theoretical Ecology (3). Hastings (Environmental Studies)
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 204, 205 and Mathematics 222A-222B or Environmental Studies 100, Environmental Studies 208 or Zoology 125, and Mathematics 119B and 119. 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 (1-3). L, I, II, III. The Staff (Chairperson in charge)
Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in ecology. Prerequisites: consent of instructor. Topics in ecological energetics and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (SU grading only.)

291. Biological Conservation (3). L. Schonewald-Cox (Environmental Studies)
Seminar—3 hours. Prerequisite: grading only. Topics will vary from year to year. May be repeated for credit. Offered in alternate years.

296. Topics in Ecology (1). L, I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: grading only. Topics in ecology. (SU grading only.)

297T. Tutoring in Ecology (1-4). L, I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—1 hour. Prerequisite: grading in ecology. Consent of instructor. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. Offered in alternate years. May be repeated for credit. (SU grading only.)

288. Group Study (1-5). L, I, II, III. The Staff (Chairperson in charge)
Prerequisite: grading only. (SU grading only.)

289. Research (1-12). L, II, III (Chairperson in charge)
Prerequisite: grading only. (SU grading only.)

Economics

(College of Letters and Science)

Robert Feenstra, Ph.D., Chairperson of the Department
Department Office, 381 Kerr Hall (916-752-0741)

Faculty
Giacomo Bonanno, Ph.D., Associate Professor
Severin Borenstein, Ph.D., Associate Professor
Colin Cameron, Ph.D., Associate Professor
Gregory Clark, Ph.D., Associate Professor
Robert C. Feenstra, Ph.D., Professor
L. Jay Helms, Ph.D., Associate Professor
Kevin D. Hoover, D.Phil., Associate Professor
Hiromitsu Kanaeda, Ph.D., Professor
Peter H. Lindert, Ph.D., Professor
Louis Makowski, Ph.D., Professor
Klaus Nehring, Ph.D., Associate Professor
Julie A. Nelson, Ph.D., Assistant Professor
Alan L. Olmstead, Ph.D., Professor
Martine Quinzii, Ph.D., Professor
John E. Roemer, Ph.D., Professor
Kevin D. Snyder, Ph.D., Assistant Professor
Steven M. Sheffrin, Ph.D., Professor
Jomquim Silvestre, Ph.D., Professor
Robert K. Triest, Ph.D., Assistant Professor
Elias H. Turna, Ph.D., Professor
Gary M. Walton, Ph.D., Professor (Economics, Management)
Leon L. Wegge, Ph.D., Professor
Wing T. Woo, Ph.D., Associate Professor
Emeriti Faculty
Anton Brzeski, Ph.D., Professor Emeritus
Bruce Glassburner, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer Emeritus
Academic Senate Distinguished Teaching Award
Thomas Mayer, Ph.D., Professor Emeritus
Y. Ishi, Professor Emeritus

The Major Program
Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these choices 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, brokerage firms, oil companies, government enterprises, and government 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 schools, or technical advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

A.B. Major Requirements:

UNITS
Preparatory Subject Matter: 22-26
Economics 1A-1B: 10

*Course not offered this academic year.

Statistics 13, 32, or 102: 4
Mathematics 16A-16B-16C or 21A-21B-21C: 9-12

Depth Subject Matter: 40
Economics 100 or 100M: 15
One course from Economics 110A, 110B, 111A, 111B: 4
One course sequence from Economics 110A-110B, 110A-111A, 110A-111B, 121A-121B, 121A-121B, 121A-121B, 121A-121B: 12
130-130-130-130: 4
136A-136B: 151A-151B: 160A-160B: 8
Additional economics courses to achieve a minimum of 40 upper division units: 18

Total Units for the Major: 62-66

Recommended
Students considering graduate study in economics or business administration 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. 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, an 8.0 or 9.0 grade point average in all economics courses must be achieved. The department will recommend students for the Phi Beta Kappa Honor Society.

American History and Institutions. This University requirement can be satisfied by completion of Economics 111A, 111B. (See also under University requirements.)


For information on admission to graduate study, degree requirements, and financial aid, contact the Graduate Announcements and contact the chairperson of the departmental graduate committee.


Courses in Economics (ECN)

Lower Division Courses
1A. Principles of Microeconomics (5). Bonanno
IL. Walton, III. Silvestre, Triest
Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

1B. Principles of Macroeconomics (5). I. Turna, II. Sheffrin and staff, III. Lindert
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, and policy. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

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 internships are under Financial Management. 1A-1B; 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: course 1A, 1B, and Mathematics 16A or Mathematics 16A and 21A with a grade of C- or better in each course. Theory and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open to students who have received credit for Agricultural 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 and Mathematics 16A or Mathematics 21A with a grade of 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) I. Bonanno
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, Mathematics 16A and 16B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signaling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle.

104. Intermediate Microeconomics (4) I, II, III. The Staff
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 to students who have received credit for course 100 or Agricultural Economics 100A or 100B. Intended for non-majors.

105. Intermediate Macroeconomics (4) I, II, III. The Staff
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 to students who have received credit for course 101. Intended for non-majors.

110A. Economic History (4) II. Clark
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe prior to the year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

110B. Economic History (4) III. Tuma
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

111A. Economic History (4) II. Walter
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.

111B. Economic History (4) III. Clark
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.

115A. Economic Development (4) I. Kareda; III. Tuma
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major issues encountered in emerging from international poverty. Issues include 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.

115B. Economic Development (4) I. Tuma; III. Kareda
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major macroeconomic issues of developing countries. Issues include problems in the generation and mobilization of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries.

116. Comparative Economic Systems (4) II. Roeper
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, 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.

121A. Industrial Organization (4) I. Bonanno
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), 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.

121B. Industrial Organization (4) III. The Staff
Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 121A. A study of private enterprise economy; antitrust and other policies toward industry; economies of regulated industries.

123. Ecology and Economics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economics and populations as self-regulating systems; economic regulation of man's interaction with its environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects for agricultural growth.

125. Urban Economics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and 100. Explores the market forces behind the development of cities, explaining the existence of cities and the spatial distribution of activity within cities. Explores the effects of policies that address problems such as poverty, inadequate housing, congestion, pollution, inferior education, and crime.

130. Public Microeconomics (4) II. Slewaite
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, 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 100M. 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, corporate income tax, and property tax); tax loopholes; recent developments; tax reform proposals.

134. Financial Economics (4) II. Quimby. III. Hehring
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100, Mathematics 16A; Statistics 13. General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the economics of information; capital market and interest rate structure; financial decisions. Students who have completed Agricultural Economics 171 may not receive credit for this course.

136. Money, Banks and Financial Institutions (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: courses 1A-1B or consent of instructor. Monetary institutions, the banking system, money creation, the Federal Reserve System, the international monetary system.

138A. Monetary Theory (4) I. Malakowski
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

136B. Monetary Policy (4) II. Salter
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 135 and 136A. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

140. Econometrics (4) I. Cameron
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 100, 101, Mathematics 16A-16B or 21A; Statistics 13. Introduction of problems of observation, estimation and hypothesis testing in econometrics through the study of the theory and application of linear regression models, critical evaluation of selected examples of empirical research and exercises in applied econometric models.

151A. Economics of the Labor Market (4) I. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M. 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. Nelson
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 wages and benefits, including theories of labor market discrimination, income distribution; poverty. Policy issues: negative income tax; manpower training programs; income policy.

160A. International Microeconomics (4) I. The Staff, II. Wingate
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 100M, or consent of instructor. International trade theory: impact of trade on the domestic and world economy; public policy toward external trade. Students who have completed course 162 may receive only 2 units of credit for course 160A.

160B. International Macroeconomics (4) II, III. Woo
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 100M, and 101, or consent of instructor. Macroeconomics theory of an open economy. Balance of payments adjustment mechanisms, international monetary economics issues; international financial institutions and their policies. Students who have completed course 162 may receive only 2 units of credit for course 160B.

162. International Economic Relations (4) I. The Staff; III. The Staff
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 migra-
tion and Investment. Emphasis on current policy issues. Course intended especially for non-majors. Students who have completed course 160A or 160B may not receive credit for this course.

170. Economy of the Middle East (4) III. Tuma 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 the Middle East. Consult department for course scheduling.

171. Economy of East Asia (4) I. The Staff (Chairperson in charge) 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.

172. Economy of South Asia (4) II. The Staff 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 South Asia. Consult department for course scheduling.

173. Economy of South-East Asia (4) III. The Staff 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 South-East Asia. Consult department for course scheduling.

174. Economy of Europe (4) III. The Staff 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 Europe. Consult department for course scheduling.

175. Economy of Sub-Saharan Africa (4) I, II, III. The Staff (Chairperson in charge) 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 Sub-Saharan Africa. Consult department for course scheduling.

190. Topics in Economics (4) III. Lindert Lecture—2 hours; independent study—2 hours. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

192W. Internship in the Davis-Washington Program (6-8) I, II, III. The Staff (Chairperson in charge) Independent study—3 hours; seminar—1 hour. 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-Washington Program. Internship with Washington-based 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 grade-point average 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 the faculty. (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 Reading 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. Caputo 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 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 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 imperfectly competitive or consumers that are imperfectly informed. (Same course as Agricultural Economics 200C.)

200D. Macroeconomic Theory (5) I. Hoover Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macroeconomic theory of income, employment, and prices.

200E. Macroeconomic Theory (5) II. Sayer Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (matrix algebra). Macrometric theory of income, employment, and prices.

201A. History of Economic Thought (3) I. Weng Lecture—3 hours; discussion—1 hour. Historical perspective on the evolution from the economic era to modern times. Offered in alternate years.

201B. History of Economic Thought (3) II. Hoover Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

203A. Advanced Economic Theory (4) I. Silverstve Lecture—4 hours. Prerequisite: course 200A. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency, intertemporal economics; uncertainty.

203B. Advanced Economic Theory: Game Theory (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A. Dynamic games in economics. Topics include sequential games, bargaining and auctions, and repeated games. (Same course as Agricultural Economics 203B.)

204. Microeconomic Analysis (5) I. Hazlett (Agricultural Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural Economics 100A-100B; Mathematics 10A or 10B, 11A or 11B, 12A or 12B. Analysis of microeconomic models of household behavior, and the theory of the firm in both perfect and imperfect markets. (Same course as Agricultural Economics 204.)

205. Contemporary Economics Seminar (1-5) I, II, III. The Staff Seminar—1 hour. Prerequisite: 204A. Seminar topics on topics of current interest. May be repeated for credit. (SU grading only.)

209A. Economics of Distributive Justice (4) I. Roeber 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.

209B. Public Ownership Economics (4) II. 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. Foundation of Decision Theory (4) III. Nehring Lecture—4 hours. Prerequisite: course 200B. Rigorous exposition of subjective expected utility theory; four formats, normative and descriptive 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) II. 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 interest of instructor.

210B. Economic History (4) I. O'Mrtoad 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) III. Lindert Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)

214A. Development Economics (4) I. Javins Lecture—4 hours. Prerequisite: Agricultural Economics 100A, 100B, course 101; Agricultural 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 countries. (Same course as Agricultural Economics 214A.)

215A. Agriculture and Economic Development (4) II. Taylor Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204, 200D or 205, and 214A and 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 sector allocation of resources. (Same course as Agricultural Economics 215A.)

215B. Open Macroeconomics of Development (4) III. Kanazawa Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204, 200D or 205, and 214A and 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 sector allocation of resources. (Same course as Agricultural Economics 215B.)

215C. Empirical Approaches to Development Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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 of empirical methods of project evaluation with and without income-distribution weights. (Same course as Agricultural Economics 215C.)

219A. Industrial Organization (4) I. Bonanno Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic
209B. Economic Models of Public Ownership (4) II. Silvestre
  Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Public ownership from the viewpoint of microeconomics, in particular,
Education

(Intercollegiate Division)
Jon Wagner, Ph.D., Acting Director of the Division and Acting Associate Dean of the College of Letters and Science (2015 Academic Surge)
Jonathan H. Sandavel, Ph.D., Associate Director of the Division
Barbara J. Merino, Ph.D., Head of Teacher Education
Barbara G. Goldman, Ph.D., Associate Director of Teacher Education
Sandra M. Murphy, Ph.D., Director of the CRESST Center
Marcia R. Goodman, Ph.D., Associate Director of the CRESST Center
Division Office, 2074 Academic Surge (916-752-8258; FAX: 916-752-5411)
Student Services, 2074 Academic Surge (916-752-0757)
CRESST Center Office, 2074 Academic Surge (916-752-0281; FAX: 916-752-6136)

Faculty
Donald G. Armitage, Ph.D., Professor
G. Philip Carwine, Ph.D., Professor
Concha Delgado-Gaitan, Ph.D., Associate Professor
Sharon S. Dougall, Ph.D., Professor
Richard A. Squire, Ph.D., Professor
Michele L. Foster, Ph.D., Associate Professor (Education, African-American and African Studies)
Patricia C. Gandara, Ph.D., Assistant Professor
Barbara G. Goodman, Ph.D., Lecturer in and Supervisor of Teacher Education (Education, Applied Behavioral Sciences)
Jack E. Lowry, M.A.T., Lecturer in and Supervisor of Teacher Education
Barbara J. Merino, Ph.D., Associate Professor
Sandra M. Murphy, Ph.D., Associate Professor
Keith H. Osajima, Ph.D., Assistant Professor (Education, Asian American Studies)
Susan A. Ostergard, Ed.D., Lecturer in and Supervisor of Teacher Education
Jonathan H. Sandavel, Ph.D., Professor
Carton J. Squire, Jr., Ph.D., Professor
Jon Wagner, Ph.D., Associate Professor
David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education
Karen A. Watson-Gedge, Ph.D., Professor
George D. Yonge, Ph.D., Professor

Emeriti Faculty
Hugh C. Black, Ph.D., Professor Emeritus
Douglas L. Minnis, Ed.D., Lecturer Emeritus
Victor A. Perkes, Ed.D., Lecturer Emeritus
Julius M. Sassennath, Ph.D., Professor Emeritus

Cooperative Research and Extension Services for Schools (CRESS) Staff
Sandra Murphy, Ph.D., Director, CRESS Center
Pam Castorii, M.A., Director, Sacramento Area Science Project
Forrest Davis, Ph.D., Education Extension Specialist for Social and Cultural Studies
Marcia Goodman, Ph.D., Associate Director, CRESS Center
Bath Hart, M.A., Education Extension Specialist for Health
Pauline Holmes, M.A., Acting Associate Director for Area 3 Miniting Project
Judith Kysh, M.A., Education Extension Specialist for Mathematics; Director, Northern California Mathematics Project; Co-Director, College Preparatory Mathematics
Rachel Lodge, M.A., Director, Healthy Start Field Office
Robin Marion, M.A., Education Extension Specialist for Science; Assistant Program Director, Sacramento Area Science Project
Jayne Marlinkin, M.A., Acting Director, Area 3 Writing Project
Kathy Medina, A.B., Co-Director, Area 3 History and Cultures Project
Wendell Potter, Ph.D., Director, Instructional Technology for LEP Students
Keith Prior, B.S., Coordinator, Instructional Technology for LEP Students
Tom Saile, Ph.D., Co-Director, College Preparatory Mathematics Project
Maryann Semons, Ph.D., Education Extension Specialist for Languages Arts and Coordinator for Teacher Research
Mary Betty Stevenson, M.A.T., Associate Director, Northern California Mathematics Project
Evelyn Vergas-Castaneda, M.A., Director, Greater Sacramento California Foreign Language Project

Program of Study
The Division of Education does not offer an undergraduate major program. However, it offers a minor.

Minor Program Requirements:

Edualional theory is considered to be the foundation or basic area for undergraduates to elect as a minor if they choose among 120 or 123 or 152 or 153 or 155 or 156.

UNITS
Education (minimum units)................. 20-23
Education 110 or 111.......................... 4
One course from Area 120 or 123............ 4
Depth courses............................... 12-15
At least 12-15 units from Education not used above: 100, 110, 111, 115, 125, 123, 133, 143, 153, or 163

Minor Advisers. All faculty members who teach undergraduate courses.

Teacher Education

For a statement of complete requirements and appointments with credential advisers, contact the Divisional Student Services Office, 2074 Academic Surge. Interested students are urged to do this as early as possible in their academic career.

Applicants to the elementary or secondary credential programs should contact the Student Services Office for forms and procedural information early in the fall quarter of their senior year.

Teacher Education Faculty Advisers—Elementary:

Secondary:
P. Holmes. J. Lowry Y Perkes, R. Van Dyne
Graduate Adviser. B. Merino, B. Goldman (Credential Program)
Graduate Study. The Division 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 Center, Division of Education, 2074 Academic Surge.


Joint UCD/CSU Fresno Doctoral Program (Ed.D.)
Rosemary Papalerti, Ph.D. (CSU Fresno) and Douglas Minnis, Ed.D. (UC Davis), Program Administrators, UC Davis Office, 252 Main Hall (916-752-1473, FAX: 916-752-0221).

The joint (UC/CSU Fresno) doctoral program leads to the Doctorate in Education (Ed.D.) in Educational Leadership. Contact Professor Rosemary Papalerti at CSU Fresno for information and application materials.

Courses in Education (EDU)

59. Directed Group Study (I-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (PHN grading only)

Upper Division Courses
100. Introduction to Schools (I) I, II, III. Lowry Wampler
Lecture-discussion—4 hours. Prerequisite: upper division standing. Study of educational concerns of teachers: skills for observing classroom activities; school organization and finance; school reform movements; observing, aiding, and tutoring in schools.

110. Educational Psychology: General (I-11) I, II, III. The Staff (Director in charge)
Lecture-discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Introduction to the human science of psychology (education) with special emphasis on the psychological perspective. Such topics as the pedagogical situation, learning and becoming, teaching and the lesson structure, and the methods of pedagogical will be considered.

111. Introduction to Psychopedagogics (I) I, II, III. Yonge
Lecture-discussion—4 hours. Prerequisite: Psychopedagogics and upper division standing. Introduction to the discipline of education of 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.

117. Psychology of Reading (I). The Staff (Director in charge)
Lecture-discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Theory and research on the psychological processes involved in learning to read. Topics include reading readiness, word recognition and spelling, knowledge of the orthographic system, phonological awareness, interactive processes, influence of dialect, difficulties of poor readers.

120. Philosophical and Social Foundations of Education (I-I) Wagner Armitage, Foster
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing. Philosophical, Historical, and Sociological study of Education and the role of the Social, General Education credit: Civilization and Culture.

122. Civil Rights of Teachers and Students (I) I, II, III. The Staff (Director in charge)
Discussion—4 hours. Prerequisite: upper division
180. Computers in Education (3) I, II, III. Carberry, Wright, Turner. Lecture—1 hour; seminar—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Applications of computing in education as instructional, instructional, and communication tools.

182. Internship (1-2) I, II, III. The Staff (Director in charge) Discussion—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. Internship in schools under supervision of a faculty member. May be repeated once for credit. (PINP grading only.)

187. Curriculum in Education (1-3) I, II, III. The Staff (Director in charge) Laboratory—1 hour; seminar—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. Leading 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 report of the student's work. May be repeated once for credit for a total of 4 units. (PINP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Director in charge) Discussion—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. (PINP grading only.)

Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) Discussion—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. (PINP grading only.)

Graduate Courses

200. Educational Research (3) I, II, Spring. Gandara, Diana. Discussion—1 hour; seminar—1 hour; laboratory—3 hours. Prerequisite: introductory statistics and graduate standing in education or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, conducting research, using appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research.

201A. Ethnographic Research in Schools: Current Theory and Practice (3) I, II, I. Dafoe, Gaitan, Watson-Gage. Lecture—1 hour; seminar—1 hour; laboratory—1 hour; field work—2 to 15 hours. Prerequisite: upper division standing. Writing reports for organizational structures of institutions, and the analysis of processes and research. The relationship between field-based research and theory development on the assumption of knowledge in specific social and cultural contexts.

201B. Educational Research in Schools I: Field-Based Research Projects (3) I, II, I. Dafoe, Gaitan, Watson-Gage. Discussion—1 hour; laboratory—1 hour; seminar—1 hour; field work—2 to 15 hours. Prerequisite: upper division standing. Using the research design of the study to gather and analyze data, and interpreting the results of the research.

202. Philosophy of Education: Models and Methods (3) I, II, III. Armstrong. Seminar—1 hour; laboratory—1 hour; discussion—1 hour; seminar—1 hour; laboratory—1 hour. Prerequisite: upper division standing in Education with course 120 or the equivalent, or consent of instructor. Examples of 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 philosophy of education. Offered in alternate years.

204. School Change and Educational Reform (3) I, II, Wagner. Lecture—1 hour; seminar—1 hour. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analyzing models, processes, and case studies of school change and educational reform with respect to variables of context of schools and school, planned and unplanned change, the moral evaluation of school change, and the role of educational research.

205. The Concept of Mind in Teaching (3) I, II, III. Armstrong. Seminar—2 hours. Philosophical analysis of the problems of educational practice which are created, aggravates, and sometimes solved by varying concepts of mind and thinking. Offered in alternate years.

207. Concepts of the Curriculum (3) I, II, III. Armstrong. Seminar—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.


211. Psychopedagogics (3) I, II, III. Young. Seminar—2 hours; discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological dimension of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

213. Individual Assessment (3) I, II, Spring. Stanoval, I. Seminar—2 hours; discussion—2 hours. Prerequisite: 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 (3) I, II. Seminar—2 hours; discussion—2 hours; term paper. Prerequisite: admission to school psychology credential program; courses 213 and 218, and familiarity with the 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. Motivation and Behavior Modification (3) I, II. Seminar—2 hours; discussion—2 hours; term paper. 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.

219. Educational Testing and Evaluation (3) I, II, III. Gandara, Diana. Seminar—2 hours. Prerequisite: course 114 and 200 or consent of instructor. Seminar and testing as theory as it applies to research in educational evaluation, with an emphasis on general ability and reading tests. Offered in alternate years.

231. Culture and Learning (3) I, II, III. Dafoe, Gaitan, Watson-Gage. Seminar—2 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analysis of major theories of relations between learning and the sociocultural context in which learning takes place, issues related to the academic achievement of different language environments.
233. Anthropology of Education (4) I. Foster
Seminar—3 hours; term paper. Prerequisites: one of the following courses: Anthropology 117, 127, 129, or 222, or Education 231, 201A, or 216, 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.)

237. Education and Social Policy (4) Y. Galland
Seminar—4 hours. Prerequisite: graduate standing in Education. 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 policy arena. Develops skills in educational policy analysis. Offered in alternate years.

239. Discourse Analysis in Educational Settings (4) I. Watson-Gagee
Seminar—3 hours; term paper. Prerequisites: graduate standing and at least one course in linguistics or sociology, or consent of instructor. Examinations for any type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (e.g., teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by students in a field setting.

241. Research on Reading and Spelling Acquisiti (4) III. Murphy, Spring
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of research on reading and spelling acquisition. Focuses on the comprehension of written and oral text, with an emphasis on the teaching and learning of comprehension processes in school settings. The course will focus on current issues and on research methodology. Offered in alternate years.

243. Research on the Teaching and Learning of Writing (4) Murphy, Spring
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Study of issues in research on composition; history of composition studies; postmodern critical discourse; product and process approaches; cognitive and social perspectives. Offered in alternate years.

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 and bilingual learners, contrastive linguistics, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual classrooms, the role 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 (4) I. Foster
Seminar—2 hours; field work—3 hours. Prerequisites: familiarity with another language and culture; graduate standing. Analysis and application of research on oral language development and literacy in minority students, through the development, implementation, and evaluation of research-based language arts curricula.

255. Curriculum Development and Evaluation in Mathematics (4) Dugdale
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division coursework in mathematics or consent of instructor. Analysis of curricular issues and decision in mathematics, including long-term trends, current status and influences, pro- posed 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 coursework in mathematics or consent of instructor. Examination of research process in mathematics education: review of critical research problems identified by researchers, evolution of trends, issues, and hypotheses in various areas of mathematics education research. Course emphasizes research foundations. Offered in alternate years.

256B. Research in Mathematics Education (4) II. Dugdale
Seminar—4 hours. Prerequisite: graduate standing in education with upper division coursework 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. Selection 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 coursework, or consent of instructor. The role of calculators, computers, and graphing calculators in mathematics education. Current research issues and activities in mathematics education. Emphasis will be placed on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Offered in alternate years.

271. Recent Developments in Social Studies Education (3) III. Lowry
Lecture—2 hours; discussion—2 hours. Prerequisites: consent of instructor. Analysis of the rationale, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

275. Effective Teaching: Teaching in Early Childhood (4) I. Minnis
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. (SU/GR grading only.)

298. Group Study (1-5) I, II, III. The Staff (Director in charge)
(SU/GR grading only.)

299. Individual Study (1-6) I, II, III. The Staff (Director in charge)
Independent study. (SU/GR grading only.)

299D. Research (1-6) I, II, III. The Staff (Director in charge)
Independent study. (SU/GR grading only.)

Course not offered this academic year.

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 development 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: must be teaching or student teaching. Principles, procedures, and materials to help secondary school teachers improve the reading competence of their students. The teaching of reading, including techniques, structural analysis, and alternative methods of coping with the problem reader in the classroom.

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 in the teaching process, introduction to media, and techniques suitable for the elementary school with emphasis on cross-disciplinary exploration.

304A. Teaching in the Elementary Schools (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 preschool or elementary schools. Selection and organization of teacher materials. Introduction to techniques of diagnosing school achievement of children.

304B. Teaching in the Elementary Schools (5-8) II. The Staff (Merino in charge)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts, music, and physical education.

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: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in intermediate 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 intermediate grades. Evaluation of teaching materials including audio-visual aids. Current middle grades curriculum with emphasis on contributions from fine arts and humanities.
Education

305C. Teaching in the Middle Grades (5-8) III. The Staff (Merino in charge)
Lecture/teaching method—2 hours; student teaching—15–30 hours. Prerequisite: course 305B; acceptance 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 Secondary Schools (5-9) I. The Staff
Lecture—2 hours; seminar—2 hours; student teaching—10-21 hours. Prerequisite: acceptance into teacher education program. Supervised teaching in regular or special education secondary school classrooms. Techniques for classroom management, constructivist goals and objectives; assessment of learning; special problems of adolescents; audio-visual techniques. Must be repeated by undergraduates for a total of 15 units; 21 units by graduates in Physical Education and Music, and 24 units by all other graduate students.

307. Methods in Elementary Science (2) III.
Wampler, Ostergaard
Lecture/discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching the physical and sciences in elementary schools.

308. Methods in Elementary Social Studies (2) II.
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. Early Childhood and Kindergarten Education (3) I. The Staff (in charge)
Lecture—3 hours. Prerequisite: upper division or professional standing. Methods, materials, and history of educational programs for the preschool through primary grades. Development of curriculum methods and materials which stress integration of appropriate subject areas with emotional, social, creative, physical, and cognitive development.

Lowry
Lecture—4 hours. Prerequisite: acceptance into a 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)
Lecture/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, methods, materials, assessment and evaluation of learning.

323B. Life Sciences in the Secondary School (3) II.
The Staff (Merino in charge)
Lecture/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, methods, materials, assessment and evaluation of learning.

324. Teaching Methods in Mathematics (3) II. Bugdale
Lecture—3 hours. Prerequisite: acceptance into a teacher education program; student teaching. Current conceptions of mathematics as a discipline and as a science, and the teaching of mathematics at the secondary level (grades 9-12). Review of innovative mathematics programs in the State.

351. Advanced Fieldwork in Bilingual Education: Teaching (3-0-0) 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 materials 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 (3-0-0) 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 a university and a professional program evaluator/supervisor in bilingual/cross-cultural education.

351A-351B-351C. School Psychology: Introduction (3-3-3) I-III.
Sandvol 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. (SU grading only.)

352A-352B-352C. School Psychology: Advanced (3-3-3) I-III.
Sandvol, Figueroa, Gandara
Seminar—2 hours; field work—4 hours. Prerequisite: courses 351A-351B-351C; 210, 219, 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. (SU grading only.)

Sandvol, Figueroa, and staff
Seminar—2 hours; internship—18-32 hours. Prerequisite: admission to school psychology credential program; courses 351A-351B-351C; 362A-362B-362C, 213, 218, 218. Individual assessment and program evaluation, mental health consultation, intervention strategies to promote the school learning and adjustment of children. Selected topics in school psychology. (SU grading only.)

398. Group Study (1-5) I, II, III. The Staff (Director in charge)
(SU grading only.)

399. Individual Study (1-5) I, II, III. The Staff (Director in charge)
(SU grading only.)

Education Abroad Program

James Gallant, Ph.D., Director
Program Office, 207 South Hall (916-752-3014)

Programs of Study

The Education Abroad Program (EAP) of the University of California offers students who meet the minimal admission requirements the opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental or social institutions of the countries or areas where study centers are located will gain substantially from first-hand academic and practical experience. The same is true for students of foreign affairs. All students, whatever their field of study, will broaden their outlook and gain new skills as the result of study in a foreign country. The academic—and non-academic—debts and credits earned in the EAP should be weighed carefully prior to departure.

Estimated all-inclusive minimum costs for the nine- to twelve-month program range from $7,000 to $16,000 (varies depending upon the country).

Application

Normally, students participate in the program during their junior year, but a limited number of students may be selected for participation as seniors. A few programs are open to sophomores and to graduate students as well. Students considering study abroad with the EAP should contact the EAP Office early in the fall quarter concerning application and filing deadlines. This is important, as deadlines for some centers, including the United Kingdom and Ireland, are in early November.

Eligibility requirements include:

- At least three regular session quarters completed in residence at UC by the time of application.
- At least 64 quarter units completed by the time of application, except for specific short-term programs.
- At least a 3.0 grade-point average for course work completed at UC at the time of application and departure.
- In most cases, 2 years (6 quarters) of University-level foreign language or the equivalent, with a 3.0 grade-point average (not applicable where classes are in English), but consult EAP Office for special requirements.
- An academic plan approved by your major adviser and the campus coordinator.
- Endorsement of the Academic Senate Committee on the Education Abroad Program.

Application forms are available from the EAP Office. A provisional academic planning form, prepared in consultation with the EAP Advisor, and the major adviser, must be submitted along with the completed application to the EAP Office prior to the appropriate deadline. Applications received after the official deadline cannot be considered.

For study abroad during the 1993-94 academic year, the application deadlines are as follows: mid-October for the Japan Global Security Studies spring quarter program; early November for the United Kingdom and Ireland, Japan, and the spring quarter programs.

*Course not offered this academic year.*
in Mexico and Costa Rica; early May for Australia, Brazil, and New Zealand for the spring semester in Costa Rica; and mid-to-late January for all other study centers. If you intend to participate in a study program during your senior year, careful advance planning is necessary to meet all academic and degree requirements will be met. Consult with your major advisor, the Dean’s Office of your college, and the campus EAP coordinator. For information on EAP centers and study programs, refer to EAP in the Programs and Courses section of this catalog.

Students who do not meet the minimal requirements for acceptance (see under Education Abroad in the Introduction section) must consult the Campus Coordinator. Students who have accumulated more than 145 units will not be accepted until the beginning of their planned year of study abroad must receive permission from the Campus Coordinator before submitting an application; the probability of such students being accepted is low.

Selection

The Academic Senate Committee on the Education Abroad Program is intimately involved in the selection of EAP participants on the Davis campus. This committee strongly recommends that prospective participants enroll in courses dealing with the country of their interest in preparation for the year abroad. Applicants who are taking or have completed such courses at the time of the campus selection process tend to have an increased probability of receiving the endorsement of the Committee, other factors being equal. 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 returns. Among other things, academic goals, knowledge of the host country and the United States and proficiency in the language of the host country, when appropriate, receive positive attention during the interviews.

Files of applicants receiving the endorsement of the Senate Committee on EAP are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selection decisions will be made.

Academic Program

In most cases, students from the University of California live as the students of the host country do and attend the same courses, taught by faculty of the host country in their own language. Thus, language skills are of utmost importance. To aid adjustment of UC students to different, often unfamiliar educational practices, tutorials are a part of the academic program of most centers. Tutorials also assist in overcoming language problems and in acquiring background information presupposed in the courses. Tutorials are given 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.

Academic Program

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 United Kingdom, Ireland, Canada, Australia, Egypt, Ghana, Hungary, and New Zealand); (2) 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 in addition to units earned in the intensive language program.

Graduation Requirements

All prospective applicants, but particularly students who intend to study abroad during their senior year, should plan their course programs for Davis and abroad carefully in order to satisfy University, College, and major requirements for the degrees. The divisional planning form is intended to take care of this, but a few potential problems deserve emphasis. Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, the major departments and programs retain the right to determine which EAP courses will be accepted in satisfaction of major requirements. Several major programs have identified key upper division courses which must be completed in residence at Davis. Major advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must complete the University residence requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy residence requirements within the final 45 units preceding entrance into the EAP. Otherwise, the final 45 units must be completed in residence at Davis. Major advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

Participants who satisfy all degree requirements while abroad and who fulfill the requirements upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transcripts from abroad take a long time to get to the home campus and are therefore not included in the academic record until returned. They may be included on the June degree list. Such returning students may participate in the June commencement ceremony, however.

Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Moreover, each of the host institutions has special areas of excellence and strength. The listing of centers below incorporates selected information concerning these points. More detailed information is available in the flyers describing each of the centers and from the EAP adviser in South Hall.

In addition to the programs listed below, Davis students have access to a variety of study and work abroad opportunities. Information can be obtained at the EAP Office in South Hall.

Europe

Austria

The program is small and is designed to offer an opportunity to pursue a specialized interest to a limited number of highly qualified students. A compulsory summer intensive language program precedes the beginning of the academic year in Vienna. All courses are taught in German.

University of Vienna. Eastern European studies (Balkans, Russia), fine arts (history of art, music, theater arts), folklore, history.

Denmark

A compulsory summer intensive language program precedes the academic year and continues through the fall semester. Instruction is in Danish, though examination in English may be available. 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 only as a short-term program option.

University of Copenhagen. Broad availability of humanities and social sciences. Programs in communications, economics and international politics, history, linguistics, and medieval studies are of particular interest.

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 Bordeaux, Lyon and Paris.


Ecole Normale Supérieure at Fontenay-Saint Cloud, Paris Region. Coursework in social sciences and the humanities.


University of Bordeaux. Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Archaeology) 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 Center for Critical Studies. In addition to required core courses in French civilization, students take courses in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

University of Pau. Pau-Paris courses, humanities, social sciences. Program in Basque studies is of special interest. Scholarships available for students of Basque or Bearnais cultural background.

University of Poitiers. Humanities is taught, with major emphasis on history and medieval studies; mathematics; physics.

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 program precedes the beginning of the academic year. All courses are taught in German.

Georg-August University, Göttingen. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

Hungary

Eötvös Loránd University, Budapest. A fall or winter long program is offered with an emphasis on Central European studies. Students take courses especially designated for EAP, and the course may be 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 Italy in order to attain the required third-year level, followed by the normal compulsory intensive-language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian.

The Bisonte International School of Graphic Arts, Florence. Coursework in graphic arts, lithography and logo printmaking.

Bocconi University, Milan. This institution offers studies in business administration, economics, management and public administration, with a special emphasis on Italian and European entrepreneurial systems.

University of Bologna. Humanities, social sciences, economics, history.

University of Padua. History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.

University of Venice. Economics, history, history of art. Scuola Normale Superiore, Pisa. Medieval and renaissance studies and links to faculty members need to be approved by the host university prior to admission into the program.

*Course not offered this academic year.
**Education Abroad Program**


II Bicentenario Internazionale di Grafico, Artistic and Lithography for advanced undergraduates. Colored slides of portfolio of etchings must be submitted for admission.

Norway. Knowledge of Norwegian is not required, but a compulsory intensive course in Norwegian (mid-June to mid-August) precedes the beginning of the academic year. Intensive language study is continued during the fall semester. All courses are taught in Norwegian.

University of Bergen. Humanities, social sciences, natural sciences, and mathematics are available, but space in the sciences may be limited. The usual pattern is study of a single subject, usually the major or a closely allied field, for the entire year.

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. Courses developed for the Center and taught by the University of Barcelona form the core of the program. EAP students are required to take at least two regular year-long courses in the University of Barcelona. (This is a cooperative program with the University of Illinois.)

University of Granada. EAP students take at least one university course during the year, and a minimum of four courses for foreigners each semester.

Complutense University of Madrid. Humanities and some social sciences. The core program, developed for the UC Study Center and other American programs, 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 in the University of Madrid.

Sweden. Compulsory intensive language course during the first semester for students who are 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. Most courses are taught in English, but a few courses offered in English may be available.

University of Lund. Broad curriculum. Excellent science programs.

United Kingdom and Ireland. The program, which includes 19 institutions, is administered by a director and associate director located in London. Following selection for participation by the EAP administration, a student must 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. Participating institutions are England: University of Birmingham, University of East Anglia, University of Essex, Colchester, 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 Salford, University of York. Occasionally, students may be placed on an ad hoc basis at other institutions. Ireland: University College, Cork, University College, Galway.

Scotland: University of Edinburgh, University College, Glasgow, University of St. Andrews, University of Strathclyde.

Wales: University College of Wales, Aberystwyth.

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 (full year) program available at the Russian State Humanities University in Moscow. Students must be members of the Moscow institutions in Russia. Intensive language study at the intermediate or advanced level for at least half of the units earned, and a wide range of area studies courses to choose from. All courses will be taught in English. Graduate student opportunities will be available.

Alexander Herzen Russian State Pedagogical University, St. Petersburg. Russian language and civilization only.

North-West Centre for Public Administration, St. Petersburg.

**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. First priority is given to students who have completed at least one year of Hebrew. A compulsory intensive language course in Hebrew precedes the beginning of the academic year.

Hebrew University, Jerusalem. Broad curriculum; emphasis on Israeli and Middle Eastern studies. UC students may be required to enroll as regular students, though admission is on merit. The program offers courses in Judaic, Israel, 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.

**Asia**

**Hong Kong.** A limited 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 16 units of Mandarin or Cantonese in their annual program.

Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available. (Information about courses to be offered in English is announced only one week before instruction begins.)

India. Instruction is in English. A compulsory intensive language program in conversational Hindi precedes the academic year. Students will take a year-long core program focused on communication, modern Indian and Western culture, and the arts. It is intended to provide an introduction to India. During the second and third quarters, students will also take regular course work at the University of Delhi.

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, economics, fine arts, and mathematics. Social sciences will find extensive coursework in these areas.

Indonesia. An eight-week intensive language program at Gadjah Mada University in Yogyakarta is required for all students. Those with less than two years of Level-2 (University level) Indonesian must then take an eight-week intensive 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. Instruction is in Indonesian; tutorial assistance may be available.

It is possible to apply for the summer intensive language program only. Students may take more advanced language in subsequent years.

Gadjah Mada University. Agriculture, anthropology, biology, economics, ecology, geography, mathematics, philosophy, political science, and social science.

Institute Seni Indonesia (ISI). The Indonesian Institute of the Arts. Visual, music, dance, theater, fine arts, and musicology.

Akademi Seni Tari Indonesia (ASTI) at Denpasar and Bandung. The Indonesian Dance Institute of Bali: dance, music, and theater.

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 no 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 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 limited number of courses taught in English are available. At least one year of university-level Japanese language study is required.

Kyushu Institute of Technology, Kitakyushu. This program, which specializes in Civil, Mechanical, and Electrical Engineering, is primarily for undergraduate students. While pursuing a research project, students will engage in language courses and a seminar on Japanese-American comparative engineering methods. One year of university-level Japanese required prior to departure.

Kyushu University, Fukuoka. This program is for graduate-level economics students. The academic program consists of Japanese language courses and a research project to be completed under the guidance of a Japanese professor. Prior Japanese language study is not required.

Nagoya University, Nagoya. This program offers 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 undergraduate level Japanese.

Osaka University, Osaka. Graduate level studies; Japanese language and a set program of economics courses. Instruction 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.
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 in Tianjin. 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 as a second language at the university. The prerequisite is one year of Chinese language and one year of teaching English as a second language at the university.

Nankai University, Tianjin. 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 taught by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisite is two years of college-level Chinese.

Taiwan, Republic of China. Students participating in the Peace Corps/Teach/Train program in Taipei receive instruction in the Chinese language and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU Intensive Chinese Programs. Courses in art history, literature, economics, history, and political science are available. Prior course work in Chinese culture, history, and language are recommended.

National Taiwan University. (This is a cooperative program with California State University International Programs.)

Thailand. 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 the Thai language and area studies classes taught in English. Students with sufficient language background (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 taken 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.

Togo. Study and field experience (SFE). An eight-week summer program conducted by UC. Four weeks of academic course work in French language and contemporary Africa are taught at the University of Benin, Lomé, followed by four weeks of field work.

Latin America

Brazil. Language requirements for admission to this program are: 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 completion of an intensive course in Portuguese prior to departure. Since courses are taught in Portuguese, the equivalent of one year of college-level Portuguese is the absolute minimum. A compulsory intensive language course precedes 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 courses offered in a wide range of fields.

Chile. Catholic 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. 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. 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 strong interest in biology, including one upper division organismal biology course, and some background in Spanish language.

Costa Rica Medical Quarter at San Jose. This winter quarter program provides medical students the opportunity to combine intensive medical Spanish instruction and clinical studies. Conversational ability in Spanish is required.

Mexico. Universidad Nacional Autonoma de Mexico (UNAM), Mexico City. A compulsory intensive language program precedes the beginning of the school year, augmented by courses in contemporary Mexican 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.

Study and Field Experience (SFE) in Mexico. Available for either Fall or Spring Quarter, the SFE program begins in Mexico City with six weeks of intensive language course work and a course on contemporary Mexican history, art, literature, etc.). The final weeks of the program are spent doing volunteer work, either outside of Mexico City to complement formal course work. Students must have completed a minimum of one year of university-level Spanish, or the equivalent, by departure.

Summer Intensive Language Quarter in Morelia. This program provides intensive instruction in Mexican society and Spanish language instruction for students who have completed one year of university-level Spanish before departure. It is not appropriate for advanced students in Spanish.

Canada

Students may enroll for 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 early March through the examination period, which starts in late May. Students must be on site in 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 New England in Armidale; 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 Adelaide and Flinders University in South Australia, and the University of Wollongong in 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, Lincoln College in Christchurch, 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 a variety of agricultural sciences are of special interest.

Endocrinology (A Graduate Group)

Judith Turgelon, Ph.D., Chairperson of the Group.

Office, 4136 Medical Sciences-1A (Human Physiology, 752-3230)

Faculty. The Group includes faculty from the Schools of Medicine, Veterinary Medicine, the California Primary Care Research Center, and the College of Agricultural and Environmental Sciences.

Graduate Study. The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.S. and Ph.D. degrees. Research and instruction are offered in topics ranging from endocrinological processes at the cellular and molecular levels to integrative systems endocrinology. Graduate students receive a strong basic science background in basic cellular, biochemical and integrative endocrinology and related course work, plus have the opportunity to select specific fields of emphasis such as molecular mechanisms of hormone action, signal transduction, metabolism regulation, growth factors, neuroendocrinology, and reproduction.

Graduate Advisers. Contact the Program Office.

Courses in Endocrinology (EDO)

Graduate Courses


Thesis Work.

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. (SU grading only.)

218. Molecular and Integrative Endocrinology (5)

Thesis Work.


220. Endocrinology Literature Critique (1), I, II.

Thesis Work. 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. (SU grading only.)
Lower Division Programs
If you enter the College of Engineering with fewer than 84 quarter units of credit, follow the lower division program specified for your major.
If you enter the College with 84 or more quarter units of credit, you must fulfill the requirements outlined in the Bachelor's Degree Requirements section of this catalog, under "College of Engineering, Unit Requirements."

Biological and Agricultural Engineering

Lower Division Program: Biological Systems Engineering
Requirements for majors in Biological Systems Engineering only.

<table>
<thead>
<tr>
<th>QUARTER</th>
<th>USUALLY TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursed</td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 21A-21B-21C-21D</td>
<td>1-2-3-4</td>
</tr>
<tr>
<td>Linear algebra</td>
<td>1-2-3-4</td>
</tr>
<tr>
<td>Mathematics 22A</td>
<td>5</td>
</tr>
<tr>
<td>Differential equations</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics 22B</td>
<td>6</td>
</tr>
<tr>
<td>General physics</td>
<td>6</td>
</tr>
<tr>
<td>Physics 9A-9B-9C</td>
<td>12</td>
</tr>
<tr>
<td>General chemistry</td>
<td>3-4-5</td>
</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>10</td>
</tr>
<tr>
<td>Organic chemistry</td>
<td>2-3</td>
</tr>
<tr>
<td>Chemistry 9A-8B (or Survey)</td>
<td>4-6</td>
</tr>
<tr>
<td>Civil Engineering 101</td>
<td>4-6-8</td>
</tr>
<tr>
<td>Biological Sciences 1A, 1B, 1C-1D</td>
<td>4-5-8</td>
</tr>
<tr>
<td>Biological Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers</td>
<td>1</td>
</tr>
<tr>
<td>Engineering 5</td>
<td>2</td>
</tr>
<tr>
<td>Circuits—Engineering</td>
<td>2</td>
</tr>
<tr>
<td>Statics—Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Properties of biological materials</td>
<td>3</td>
</tr>
<tr>
<td>Biological Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Expository writing—English 1 or 2 or Comparative Literature 1, 2, or 3</td>
<td>1-3</td>
</tr>
<tr>
<td>Introduction to public speaking or group communication—Rhetoric and Communication 1 or 2</td>
<td>1-3</td>
</tr>
<tr>
<td>Humanities—Social Sciences electives and General Education electives</td>
<td>3-4</td>
</tr>
<tr>
<td>Total Lower Division Units</td>
<td>98</td>
</tr>
</tbody>
</table>

† Rhetoric and Communication 1 or 2, or an acceptable substitute as approved by the Undergraduate Committee of the College of Engineering.

Biological and Agricultural Engineering

Lower Division Program: Food Engineering
Requirements for major in Food Engineering.

<table>
<thead>
<tr>
<th>QUARTER</th>
<th>USUALLY TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursed</td>
<td></td>
</tr>
<tr>
<td>Calculus—Mathematics 21A-21B-21C-21D</td>
<td>1-2-3-4</td>
</tr>
<tr>
<td>Linear algebra</td>
<td>1-2-3-4</td>
</tr>
<tr>
<td>Mathematics 22A</td>
<td>5</td>
</tr>
<tr>
<td>Differential equations</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics 22B</td>
<td>6</td>
</tr>
<tr>
<td>General physics</td>
<td>6</td>
</tr>
<tr>
<td>Physics 9A-9B-9C</td>
<td>12</td>
</tr>
<tr>
<td>General chemistry</td>
<td>3-4-5</td>
</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>10</td>
</tr>
<tr>
<td>Organic chemistry</td>
<td>2-3</td>
</tr>
<tr>
<td>Chemistry 9A-8B</td>
<td>4-5</td>
</tr>
<tr>
<td>Biological Sciences 1A</td>
<td>4</td>
</tr>
</tbody>
</table>
Electrical and Computer Engineering Lower Division Program
Requirements for Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science and Engineering majors only.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus Mathematics</td>
<td>16</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td>5</td>
</tr>
<tr>
<td>Differential Equations</td>
<td>6</td>
</tr>
<tr>
<td>General Physics</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Computer Science Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Software Development</td>
<td>4</td>
</tr>
<tr>
<td>Computer Structure &amp; Assembly</td>
<td>4</td>
</tr>
<tr>
<td>Statics Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Properties of Materials</td>
<td>4</td>
</tr>
<tr>
<td>Expository Writing</td>
<td>4</td>
</tr>
<tr>
<td>Public Speaking</td>
<td>4</td>
</tr>
<tr>
<td>Humanities-Social Sciences/General Education Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

Total Lower Division Units: 91

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

Aeronautical Science and Engineering Lower Division Program
Requirements for Aeronautical Science and Engineering, Materials Science and Engineering, Mechanical Engineering, and Mechanical Engineering/Materials Science majors only.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus Mathematics</td>
<td>16</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td>5</td>
</tr>
<tr>
<td>Differential Equations</td>
<td>6</td>
</tr>
<tr>
<td>General Physics</td>
<td>16</td>
</tr>
<tr>
<td>General Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Computer Science Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Software Development</td>
<td>4</td>
</tr>
<tr>
<td>Computer Structure &amp; Assembly</td>
<td>4</td>
</tr>
<tr>
<td>Statics Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Properties of Materials</td>
<td>4</td>
</tr>
<tr>
<td>Expository Writing</td>
<td>4</td>
</tr>
<tr>
<td>Public Speaking</td>
<td>4</td>
</tr>
<tr>
<td>Humanities-Social Sciences/General Education Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

Total Lower Division Units: 91

† Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.
Suggested elective courses:
Aeronautical Science and Engineering 131, 137, 139
Mechanical Engineering 172


Aeronautical Science and Engineering
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Minimum units required for major: 186.

Subject Areas and Courses
Electronic circuits—Engineering 100
Applied mechanics—Engineering 102, 104A, 104B
Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165
Fluid mechanics—Engineering 103A, 103B, 103L
Aerodynamics—Aeronautical Science and Engineering 126, 127
Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 138A
Aircraft preliminary design—Aeronautical Science and Engineering 130
Aeropace structures—Aeronautical Science and Engineering 133, 135
Measurement systems—Mechanical Engineering 176
Controls and system analysis—Mechanical Engineering 171
Applied mathematics—Select one course from Engineering 180; Applied Science 115 or Mathematics 128C
Technical electives—13

Strongly recommended: Aeronautical Science and Engineering 131, 137, 139; Mechanical Engineering 172.


Humanities—Social Sciences electives and/or General Education electives—12

Total Units for Upper Division Program—95

Biological and Agricultural Engineering: Biological Systems Engineering

Commercial enterprises in plant and animal production, biotechnology, food processing, greenhouses and nurseries, forest and aquatic all need engineers with a background in biology. Concern for the environment is creating new engineering opportunities as society strives to maintain a balance within the biosphere. The combination of biology and engineering offers a challenging and socially useful career. Engineers with an understanding of living systems are in increasing demand to create the equipment, processes, and systems for production and use of biological materials. Students in the Biological Systems Engineering program may select courses from the curriculum according to their interests and future career goals. The program offers a set of courses in mathematics, physics, chemistry, and basic engineering science that is common to other engineering disciplines. In addition, the sequence provides a basic foundation in biological sciences in preparation for the more advanced Biological Systems Engineering courses where biology and engineering are brought together in the analysis and design of biological systems. The program offers flexibility in the selection of technical electives ranging from biochemistry to plant and animal production to advanced mechanical design courses. Given the flexibility in the program, you are strongly encouraged to consult a faculty adviser when planning your program and selecting elective courses.

Areas of Specialization
Although specialization is not required, the Biological Systems Engineering program allows a student to select one of the following three specialization: agricultural engineering, aquacultural engineering, or forest engineering. If you want to specialize, you may follow during your junior and senior years, the area of specialization which is of interest to you. If you want to specialize in some other area, you should consult a department adviser.

Agricultural Engineering
is the application of engineering principles to the production, processing, packaging, and use of agricultural materials. The field integrates many traditional engineering disciplines, with special attention to the interface between physical systems and agricultural products. Students can emphasize the management of crops (soil, water, and air), plant production and greenhouse facilities, animal production and facilities, machinery, electronic systems, energy resources, and processes.

Suggested technical electives:
Biological Systems Engineering 114, 125, 132, 145, 175
Mechanical Engineering 102, 104B
Civil and Environmental Engineering 141
Mechanical Engineering 150A
Soil Science 100
Pomology 102
Vegetable Crops 101

Aquacultural Engineering
are involved in the design, fabrication and management of equipment and facilities for culturing, harvesting, and handling aquatic plants and animals. Understanding the environmental requirements of cultured organisms is an essential consideration in the design and management of aquaculture operations. and strong foundations in biology and water quality are stressed in the aquaculture engineering specialization.

Suggested technical electives:
Biological Systems Engineering 114, 125, 131, 132, 145, 175
Applied Biological Systems Technology 161, 163
Animal Science 118
Civil and Environmental Engineering 141, 141L, 145
Engineering 102
Wildlife and Fisheries Biology 121
Suggested Advisers: Fridley, Garrett, Plechatka

Forest Engineering
is the application of engineering principles and knowledge to the management of forest resources including the management of forests and forest land. Ecological, aesthetic, and recreational aspects of this renewable natural resource are integrated into systems for the production of forest products and the protection and management of other resources of forestry. This specialization is administered in cooperation with the Department of Forestry and Resource Management at UC Berkeley. Fall quarter of the junior year is normally spent on the Berkeley campus, following an eight-week summer field course sequence at the UC Forest Camp near Quincy, California.

Suggested technical electives:
Biological Systems Engineering 114, 115, 116, 125
Engineering 102, 104B
Forestry 101, 102, 103, 110, 113, 120, 125

Forest Products 132
Mechanical Engineering 150A
Geography 106
Soil Science 100

The Forestry Summer Camp courses (Forestry 100A through 100E) are recommended for students in the Forest Engineering specialization.

Suggested advisers: Fridley, Hertsho, Miles.

Biological Systems Engineering Curriculum

Minimum units required for major: 186

Upper Division Requirements:

Subject Areas and Courses
Mathematics/Statistics—Civil and Environmental Engineering 114

Engineering Science—Civil and Environmental Engineering 141L; Engineering 102, 104B, 164 or Forest Products 132; and at least three units from Biological Systems Engineering 115, 179, Engineering 105B, Chemical Engineering 161, Civil and Environmental Engineering 141.

Engineering design electives—Select at least three units from: Biological Systems Engineering 114, 116, 125, 132, 145; Applied Biological Systems Technology 161, 163; Environmental Engineering 132A, 145 or Mechanical Engineering 150A.

Humbalities—Social Sciences/General Education electives—16

Total Units for Upper Division Program—88

Master Undergraduate Adviser: Delwiche.
The food industry is the largest industrial sector of the U.S. economy, creating many employment opportunities. Food engineers help develop new food products. They also conceive, design and operate processes, equipment and plants for efficient production of foods with minimal impact on the environment. Food engineers may work for food companies in product 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 Curriculum

Minimum units required for major: 187 or 188.
Upper division requirements.

UNITS
Subject Areas and Courses
Mathematics/Statistics—Agricultural Science and Management 150
Engineering Science and Design—Biological Systems Engineering 125, 165, Chemical Engineering 150A (or Engineering 103A), 157, 159; Engineering 36, 108, 104A, 105A, 108B, 106; Mathematical Sciences 155, 165, 40 (or 39B), 169; Food Engineering—Biological Systems Engineering 130, 131, 132, 170A, 170B, 170C, 175; Biological Sciences 102; Chemistry 107A (or 117A); and Technology 94, 151 ...

Humanities-Social Sciences electives/General Education electives...

Total Units for Upper Division Program...
33 or 34

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 careers 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 you with the necessary knowledge and skills necessary so that you may achieve competence in not only current technical problems, but also those that will arise in the technologies of the future. In your junior year, you focus your attention on technical courses, particularly thermodynamics, fluid mechanics, and energy transfer. In your senior year you apply these fundamentals to real-world problems associated with a variety of industries.

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, to explore new areas, or to pursue areas of specialization. This is one of 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. This student must complete 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, 128B, 128C, 128D, 130, 131, 150
Fiber and Polymer Science 100, 110

Applied Mathematics. The mathematics specialization is designed both to strengthen your understanding of the foundations of engineering science and to improve 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 Mathematics 115, 116

Biomedical Engineering. This area of specialization prepares you to do graduate work in biomedical engineering and to find employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:
Strongly recommended
Microbiology 102, 102L, 130A
Biological Sciences 102, 103
Chemical Engineering 161

Also recommended
Genetics 102A, 102B, 103L
Biological Sciences 101
Biochemistry and Biophysics 11L, 110L, 123, 123L, 133
Microbiology 130B and 130C
Plant Science 140
Virology and Epilogue 18

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 modern computer science, using high-level programming languages, particularly thermodynamics, fluid mechanics, and energy transfer. In your senior year you apply these fundamentals to real-world problems associated with a variety of industries.

The following list of elective courses is suggested to 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 126B, 128C

Civil and Environmental Engineering 153
Automatic Control
Electrical and Computer Engineering 150, 151, 151L
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
Chemical Engineering/Materials Science and Engineering

Minimum units required for major: 194-195

Subject Areas and Courses


Chemistry—Chemistry 110A, 110C... 

Quantum mechanics—Physics 3D or Chemistry 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, 155, and three laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L, 140L, 142L, and 144L...

Humanities—Social Sciences and/or General Education electives...

Total Units for Upper Division Program...99-100

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 to humanity’s continued health and well-being by the design and construction 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 recreation facilities. 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 should consult a faculty 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 be aware of the technical and social aspects of your environment. Among the many courses available in the area are selected for your interest and convenience. The courses in this area are offered in the following paragraphs.

AREAS OF SPECIALIZATION:

Civil Engineering Planning: Specialization in this area is directed toward 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 advice of a faculty adviser and to complement the technical electives with coursework in the humanities and social sciences.

Suggested technical electives:

Agricultural Economics 147, 148, 176

Civil and Environmental Engineering 137, 146, 152, 153, 158A, 158N...

Economics 125, 130, 131

Engineering 160 (only one unit of credit towards Technical Elective requirement)


Geography 155, 162

Geology 134

Political Science 100, 101, 102, 107, 108

Water Science 108


Environmental Engineering: Specialists in this area are concerned with improving and maintaining the quality 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 based on fundamental science and civil engineering and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable water-supply systems; and environmental monitoring.

Suggested technical electives:

Atmospheric Science 120, 121A, 121B, 158

Biological Sciences 102, 103

Chemical Engineering 154A, 154B, 156A, 156B

Chemistry 107A, 107B, 110A, 126A, 126B

Civil and Environmental Engineering 140L, 142L, 144, 145, 146, 147, 148B, 149, 152

Engineering 180

Environmental Studies 150A, 150B, 150C, 151, 166

Mathematics 128A, 128B, 128C

Mechanical Engineering 161

Microbiology 102, 103, 103A

Statistics 130A, 130B


Structural Engineering, Structural Mechanics, and Geotechnical Engineering: This area is concerned with the conception, design, analysis, 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 and geotechnical engineering is concerned with the theoretical aspects of structures, such as mathematical analysis and characterization of material properties.

Suggested technical electives:

Aeronautical Science and Engineering 135, 137

Art Studio 121A


Engineering 122, 180

Materials Science and Engineering 139

Mathematics 128A, 128B, 128C


Transportation Planning and Engineering: Specialize in this area if you are concerned with the design, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning and design knowledge of the basic concepts of engineering, economics, law, and planning is essential in the development of programs, projects, 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 acquire an awareness of the social sciences and environmental sciences through coursework in these areas.

Suggested technical electives:

Civil and Environmental Engineering 137, 149, 152, 153, 160, 161, 162, 163

Engineering 160 (only one unit of credit towards Technical Electives requirement)

Environmental Studies 167, 168A, 168B, 171, 173, 174, 176


Water Resources Engineering: This area includes hydrology, hydraulic, and water resources systems planning and design. Long-term is concerned with flow in pipes and open-channel water distribution systems and through hydraulic structures. Water resources systems planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on 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 Economics 146, 176
Atmospheric Science 120, 121A, 121B
Civil and Environmental Engineering 122L, 144, 145, 146, 148B, 152, 153
Electrical and Computer Engineering 150A, 150B
Environmental Studies 128, 150A, 151
Geography 162
Water Science 103, 110, 150, 160

Civil Engineering
(Officially Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180

UNITS

Subject Areas and Courses
Applied mechanics—Engineering 103A, 104A, 104L..............................7
Applied thermodynamics—Engineering 105A or
Chemistry 110A.................................................................11
Structures—Engineering 104B; Civil and Environmental Engineering 131A........................................6
Soil mechanics—Civil and Environmental Engineering 171, 171EL......................5
Hydraulics and water resources—Civil and Environmental Engineering 141, 141L, 142, 142L........................................11
Environmental—Civil and Environmental Engineering 148A.................................7
Civil engineering design—Civil and Environmental Engineering 132B, plus any three courses from Civil and Environmental Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one from courses 134, 145, 148B, 162, or 173)......................18
Economics—Engineering 106.................................................................3
Engineering mathematics—Applied Science 115; Civil and Environmental Engineering 115, and either Applied Science 114 or
Chemistry 110A; Materials Science and Engineering 130........................................14
Transportation electives—select from Civil and Environmental Engineering 160, 161, or 163..............................3
Technical electives.................................................................10
Six of these may be selected from
Civil and Environmental Engineering 115, and Civil and Environmental Engineering 114, and either Applied Science 114, 115, or 116; Civil and Environmental Engineering 115; and Chemical Engineering 130; or any of Civil and Environmental Engineering 132B or 153..................................................9

Total Units for Upper Division Program.................................................90

Civil Engineering/Materials Science and Engineering
Minimum units required for major: 185

UNITS

Subject Areas and Courses
Electronic circuits—Engineering 100..................................................3
Applied mechanics—Engineering 103A, 104A, 104L..............................7
Applied therapeutics—Engineering 105A or
Chemistry 110A; Materials Science and Engineering 130........................................14
Structures—Engineering 104B; Civil and Environmental Engineering 131A........................................6
Soil mechanics—Civil and Environmental Engineering 171, 171EL........................................5
Hydraulics and water resources—Civil and Environmental Engineering 141, 141L, 142, 142L........................................11
Environmental—Civil and Environmental Engineering 148A.................................7
Civil engineering design—Civil and Environmental Engineering 132B, plus any three courses from Civil and Environmental Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one from Civil and Environmental Engineering 134, 145, 148B, 162 or 173)........................................12
Economics—Engineering 106.................................................................3
Engineering mathematics—Applied Science 115; Civil and Environmental Engineering 115, and either Applied Science 114 or
Chemistry 110A; Materials Science and Engineering 130........................................14

†Civil Engineering 110 is a required prerequisite to
Civil Engineering 171.

Electrical Engineering and Computer Science

The Department of Electrical Engineering and Computer Science administers two curricula in the College of Engineering and one curriculum in the College of Letters and Science. Through its Electrical and Computer Engineering Division, it administers the Electrical Engineering, the Computer Engineering, and the Electrical Engineering/ Materials Science and Engineering curriculum. Through its Computer Science Division, it administers the Computer Science and Engineering curriculum.

The upper division requirements for the degrees in Electrical Engineering, Computer Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering are described below.

Computing Majors
There are three computing majors offered within the College of Engineering by the Electrical Engineering and Computer Science Department: Electrical Engineering with a computer specialty, Computer Engineering, and Computer Science and Engineering. All of these computing majors require students to develop a foundation in each of three fields: electronics, computer hardware, and computer software. A graduate of any of these majors has sufficient background to do further work in any of the three fields, either in industry or postgraduate studies. However, each curriculum offers a different mix of the three fields.

All three curricula require 63 of the approximately 90 upper division units to be divided into the three areas of electronics, computer hardware, and computer software. The Electrical Engineering with computer specialty and the Computer Engineering curriculum divide these 63 units almost equally between electronics, computer hardware and computer software (with the most flexibility found in the Computer Engineering curriculum). The Computer Science and Engineering curriculum divides these 63 units primarily between computer hardware and computer software.

Because Electrical Engineering is one of the few engineering majors recognized in all five states for professional registration, some computing majors wish to pursue a double major in either Electrical Engineering and Computer Engineering or in Electrical Engineering and Computer Science and Engineering. Students interested in this option should check with a staff adviser since course selections must be planned very carefully. However, it is possible to obtain a double major in Electrical Engineering and Computer Engineering with only 196 units (12 more than either degree alone) or in Electrical Engineering and Computer Science and Engineering with 214 units.

Electrical Engineering Curriculum

Electrical Engineering involves the design, analysis, and effective use of electrical systems, including electronic computers. Electrical systems and computers can be a central role in nearly all aspects of modern life, including communications, medicine, education, environmental protection, space exploration, defense, and home entertainment.

The Electrical Engineering curriculum is designed to provide students with a solid foundation in mathematics, physics, and electrical engineering subjects, to ensure the ability to solve problems in systems, (2) electronic devices and fabrication, (3) computer hardware, (4) computer software, (5) electromagnetics and optics, and (6) communications and control systems. Through the choice of the 25 units of very flexible design and unrestricted electives, it is possible to focus on any of these six specialties or to distribute the 25 units of electives among these areas. You may seek guidance in your selection of these electives through the departmental staff.

Students who complete the Electrical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all states as eligible for registration as a Professional Engineer.

Computer Engineering

(Officially Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Minimum units required for major: 180

UNITS

Required Courses
Electrical engineering core—Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 185A, plus two courses from 110B, 130B, 140B, 150B....................................................34
Computer software—Electrical and Computer Engineering 173.................................4
Thermodynamics—Engineering 105A..................................................3
Probability theory—Statistics 120, 131A, or Mathematics 131......................................4
Professional responsibilities—Engineering 160, 161 or Applied Science Engineering 137.....................................................7
Design electives.................................................................18
Select six courses, at least two with laboratories, from:
May also include approved electrical and Computer Engineering or Computer Science Engineering 192 or 193 courses.

Mathematics/Science elective—to be selected from the College of Engineering Physical and Biological Sciences Elective list plus Statistics 36 or any other division Mathematics or Statistics course except: Mathematics 128ABC, 160, 164, 168, or Statistics 102, 103, 104, 105, 108, 110, 111, 111A, 111AB, 111B. Mathematics 102, 51, or 52. Physical and Biological Sciences Elective electives.....................................................12

Unrestricted electives...............................................................7

Total Units for Upper Division Program.................................................90

‡Electrical and Computer Engineering 116B may not be counted toward either the Electrical Engineering Core requirement or the Electrical Engineering Design Electives.

Computer Engineering

Computer Engineering involves the design, development, analysis, organization, theory, programming, and application of digital computers. It combines many aspects of electronics, computer hardware, and computer software.

*Course offered not offered this academic year.

Engineering 160, 142, 144, 146, 147, 148, 149, 150) during the fourth year.

Technical electives, selected from other engineering or related undergraduate disciplines, give you a degree of specialization at the bachelor’s degree level. They also provide preparation for research in a selected area at the graduate level. Twelve technical elective units may be selected 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 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 advisor in the preparation of study lists.

Suggested technical electives:

**Aerospace Structures:**
- Aeronautical Science and Engineering 130, 133, 135, 137, 139

**Astronautic 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
- Physiology 111A, 111B, 112, 113
- Physical Education 101, 102

**Chemical Corrosion:**
- Chemistry 110A, 110B, 110C of 107A, 107B
- Chemical Engineering 151, 152A, 152B

**Computers:**
- Applied Science Engineering 116
- Computer Science Engineering 110, 122A, 122B, 142, 151A, 151B
- Electrical and Computer Engineering 170, 172, 180A, 180B
- Mathematics 128A, 128B, 128C
- Statistics 130A, 130B

**Electronic Materials:**
- 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
- Biochemistry and Biophysics 101A, 101B
- Water Science 41
- 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 104B, 106
- Materials Science and Engineering 146, 148, 155
- Mechanical Engineering 150A, 150B
- 150L, 151, 152, 153, 155
- Civil and Environmental Engineering 139

**Physics of Solids:**
- Physics 115A, 115B, 140A, 140B
- Electrical and Computer Engineering 145A, 145B, 148

**Suggested electives:**

---

**Materials Science and Engineering**

Minimum units required for major: 183

**UNITS**

**Subject Areas and Courses**

Electronic circuits—Engineering 100, 104A, 104B, 104C
- Applied mechanics—Engineering 103A, 104A, 104B
- Applied thermodynamics—Engineering 105A
- Materials Science and Engineering 130
- Materials in current from Materials Science and Engineering 140, 148, 149, 155
- Measurements and laboratory—Materials Science and Engineering 132L, 134L, 138L, 140L
- Mechanical engineering
- Materials science fundamentals—Materials Science and Engineering 132, 134, 136
- Materials science applications—Select from Materials Science and Engineering 142 (with 142L), 144 (with 144L), 147, 148, 155
- Applied mathematics—Select one course from Engineering 160, 182; Mathematics 131; Statistics 120, 131A; Chemical and Environmental Engineering 114
- Basic science—Select from Chemistry 110A, 110C or Physics 140A, 140B, or Chemistry 128A, 128B, or Physics 121, 122A, or Geology 117A, 117B, or Physiology 110, 110L
- Technical electives (Engineering 104B recommended)
- Humanities-Social Sciences electives and/or General Education electives

**Total Units for Upper Division Program:** 92

**Mechanical Engineering**

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems, including the application of physical and mechanical sciences 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, materials science, and economics. You may select your study's interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering the engineering profession at the bachelor's level.

You are encouraged to select elective courses from among the areas of specialization listed below.

**AREAS OF SPECIALIZATION:**

**Creative 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 solutions to such major social problems as environmental pollution, lack of mass transportation and of raw materials, and energy shortages, will depend heavily on the engineer’s ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and be able to solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of the 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)
- Mathematics Science and Engineering 140, 142, 125
- Mechanical Engineering 134, 150B, 151, 152, 161, 162, 172, 184A with 184B (both courses must be taken), 185, 187, 188


**Energy Systems.** This area is specifically designed for those who wish to work in the fields of power generation, propulsion for transportation, and energy conversion. In these fields, the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage. The program of study is based on the fundamentals of field mechanics, thermodynamics, and heat transfer. These fundamentals are applied to combustion engines, gas turbines, heat exchangers, nuclear reactors, fusion power plants, solar energy systems, and others.

Suggested technical electives:

Aeronautical Science and Engineering 138A
- Engineering 160 (only one unit of credit towards Technical Electives requirement)
- Mechanical Engineering 150L


**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 and in 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 are equipped with conventional, computer-controlled and nonconventional manufacturing equipment. 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 50, 151, 153, 172

Suggested advisors: J.R. Groza, J.M. Henderson, B. Ravan, K. Yamauchi

**Systems Dynamics and Control.** Engineers are increasingly concerned with the performance of integrated systems in which it is not possible to optimize component parts without considering the overall system. System 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 involves the continuous variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical actuators, design and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, and the analysis of fuel management systems.

An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, trusses, and steering systems as well
Mechanical Engineering/Materials Science and Engineering

Minimum units required for major: 185.

Subject Areas and Courses

Electronic circuits—Engineering 100 ................. 3
Applied mechanics—Engineering 102, 104A, 104B
Applied thermodynamics—Engineering 105A, 105B; Mechanical Engineering 156
Fluid mechanics—Engineering 103A, 103B
Mechanical engineering design—Mechanical Engineering 150A, 150B; and one course from: Engineering 180 or 182; Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114
Technical electives—Select from: Engineering 180 or 182; Mathematics 131; Statistics 120, 131A; Civil and Environmental Engineering 114

Courses in Engineering (ENG)

Lower Division Courses

3. Introduction to Engineering Systems (3) I, II
The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: algebra and trigonometry. Introduction to the engineering profession. General view of the engineering process as obtained by participation in laboratory experiments illustrating the solution of representative, but generally simplified, engineering problems. (PIN grading only.)

4. Engineering Graphics in Design (3) I, II
Henderson, Yarnazaki
Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry, orthographic projection, and freehand drawing; their application in the representation, visualization, and solution of engineering problems. Computer-aided graphics. Introduction to engineering design.

5. Applications of Computers (3) I, II, III
The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Digital computer and computer programming in FORTRAN. Algorithms and their selection and programming; debugging of programs; approximate computing-accuracy and significant; solving simple numerical and nonnumerical problems.

11. Issues in Engineering (3) I
Shackford
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 (4) I, II, III
The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. Basic circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinuosoidal excitation and phasors, and complex frequency and network analysis.

20. The Technological World (3) II
The Staff
Lecture—3 hours. Prerequisite: high school algebra. The nature of technology; computers and automation; energy systems; engineering design, analysis, and problem solving; metric system; patents and creativity. Technology and social change; technology assessment and technological choices. Intended primarily for students who are not engineering or science majors. Engineering or physical science students may receive only 2 units of credit. General Education credits: Nature and Environment.

25. Introduction to Physical Devices and Systems (3) II
Henderson
Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: lower division standing in engineering and consent of instructor. Introduction to hardware and software devices with the overall goal of enriching students understanding of physical devices and systems.

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 9C. Force systems and equilibrium conditions with emphasis on engineering problems.

36. Dynamics (3) I, II, III
The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 35, Mathematics 21D. Open to College of Engineering students only. Kinematics of particle and systems of particles, and of rigid bodies applied to engineering problems.

45. Properties of Materials (4) I, II, III
The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in Engineering. Introductory course on the properties of engineering materials and their relation to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (3) III, IV
Sunderland
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 17. Introduction to hybrid and digital circuit and system design through hands-on laboratory projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit.

102. Intermediate Dynamics (3) I, II, III
The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 36, 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.

102L. Dynamics Laboratory (1) I, II, III
The Staff
Lecture—1 hour; laboratory—1 hour. Prerequisite: course 102B (may be taken concurrently). Experimental laboratory to demonstrate fundamental principles of dynamics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurement.

103A. Elementary Fluid Mechanics (3) I, II
The Staff
Lecture—3 hours. Prerequisite: course 36A (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
The Staff
Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow, boundary layer flow, potential flows, compressible flows.
103L. Fluid Mechanics Laboratory (1) II, III. White Lecture—1 hour, discussion—1 hour, and laboratory—1 1/2 hours. (Alternate weeks with course 105L.) Prerequisite: course 103B (may be taken concurrently). Basic principles and devices which are common in fluid mechanics are illustrated with a series of experimental demonstrations. Experiments are concerned with fluid properties, viscosity, and velocity measurement. (IPN grading only.) Not open for credit to students who have completed Civil Engineering 141L.

104A. Mechanics of Materials (3) II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 104A. Open to Engineering students only. Deflections due to bending of beams, unsymmetrical bending; application of energy methods to bending problems; yielding and plastic deformation in beams, limit analysis; buckling of columns.

104B. Mechanics of Materials Laboratory (1) II, III. Chair Laboratory—3 hours. Prerequisite: course 104B (may be taken concurrently). 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) II, III. The Staff Lecture—3 hours. Prerequisite: Mathematics 21D, 22C; 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, reversible and irreversible, thermodynamic temperature scales, power cycles: Carnot, Rankine, Brayton, and applications of thermodynamics to engineering systems.

105B. Thermodynamics (3) I, II, III. The Staff 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.

105L. Thermodynamics Laboratory (1) I, II, III. Shew Laboratory—1 hour, discussion—1 hour, and laboratory—1 1/2 hours (alternate weeks with course 103L). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of state, the first and second laws of thermodynamics, and thermodynamic cycles. (IPN grading only.)

107. Engineering Economics (3) I, III. Hartbough, 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 risk, and risk and uncertainty are applied to methods of selecting most economic alternatives.

111. Electric Power Equipment (3) I, III. Chancellor, DeWitche, Hartbough Lecture—2 hours; laboratory—2 hours. Prerequisite: course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selected alternate electric power equipment components based on their construction features and performance characteristics.

122. Introduction to Mechanical Vibrations (3) I. Hubbard Lecture—3 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.

160. Environmental Physics and Society (3) I. Jungerman, Craig Lecture—3 hours. Prerequisite: Physics 90D, 9C, or 10 or 15 and Mathematics 169 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 as Physics 160.) (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) General Education credit: Contemporary Societies or Nature and Environment.

162. Advanced Energy Technology (4) I. Craig Lecture—3 hours; discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on quantitative understanding. About 20 percent of course is policy oriented. Designed to mesh with course 160, which is primarily policy. (IPN grading only.) Offered in alternate years.

164. Introduction to Biomedical Engineering (3) I. Katz Lecture—3 hours. Prerequisite: upper division standing in engineering or consent of instructor. Introduction to and survey of applications of engineering principles and methods to problems in biology and medicine. Material will include both experimental and theoretical techniques, and will emphasize determinations of relevancy and the utility of the applications. Offered in alternate years.

168. Engineering Analysis (3) I. Hafetz Lecture—3 hours. Prerequisite: Mathematics 228. 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 network, mechanical vibrations, and elasticity.

182. Engineering Analysis in Applied Mechanics (3) III. Bever Lecture—3 hours. Prerequisite: course 105B (may be taken concurrently) and Mathematics 228. Introduction to the mathematics of optimum design. The calculus of variations with applications to dynamics and design. Limit analysis and the solution of linear dynamical systems. Emphasis on analytical methods and computer aids.

190. Professional Responsibilities of Engineers (3) 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.

Graduate Courses

254. Manufacturing Engineering (3) II. Dorf Lecture—3 hours. Prerequisite: course 100, Statistics 120. Manufacturing and process engineering, productivity, planning, production and operations, inventory and facilities, quality, robots, and flexible manufacturing systems.

291. Seminar in Teaching (1) II. The Staff Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (Su grading only.)

Engineering: Applied Science

(Complied by Engineering)

Neville C. Luhmann, Jr., Ph.D., Chairperson of the Department

Ann E. Orel, Ph.D., Vice Chairperson of the Department

Department Office, 228 Walker Hall (916-752-0360)

*Course not offered this academic year.

Faculty

Meera M. Blattner, Ph.D., Associate Professor
Richard Christensen, Ph.D., Professor
Paul L. Craig, Ph.D., Professor
Stephen P. Cicero, Ph.D., Professor
John S. De Grutt, Ph.D., Professor
Raul Drake, Ph.D., Professor
Roger A. Hase, Ph.D., Professor
William G. Hooper, Ph.D., Professor
David C. Hwang, Ph.D., Associate Professor
Neville C. Luhmann, Jr., Ph.D., Professor
Nelson Max, Ph.D., Professor
William McQuighan, Ph.D., Professor
Ann Orel, Ph.D., Associate Professor
Gary Rodrigue, Ph.D., Professor
Rao Venuri, Ph.D., Professor
Frederick Wood, Ph.D., Professor
Yin Yeh, Ph.D., Professor

Emeriti Faculty

Benny J. Adler, Ph.D., Professor Emeritus
Stewart D. Bloom, Ph.D., Professor Emeritus
John Kileen, 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

Courses in Engineering: Applied Science

Davies (EAD)

Lower Division Courses

90C. Research Group Conference for Lower Division Students (1) I, II. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: lower division standing; consent of instructor. May be repeated for credit. (IPN grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor and lower division standing. (IPN grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (IPN grading only.)

Upper Division Courses

115. Introduction to Numerical Methods for Engineers and Scientists (3) I, II, III. The Staff Lecture—3 hours; Prerequisite: Engineering 5, Mathematics 228. 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.


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 12B, 5C, 90D, or 10. Scientifical and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radioelastic effects, radiotoxicity, electromagnetic pulse, ICBE accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on effects of maximum credible detonations. (Same course as Physics 137.) (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) General Education credit: Contemporary Societies or Nature and Environment.
147. Arms Race Technologies and Strategies (3) I. Craig
Lecture—2 hours; discussion—1 hour. Prerequisite: course 137/Physics 137. Technological and strategic issues in the nuclear arms race. Characteristics of nuclear weapons and weapons defense systems; responses and counter-responses. Advantages and disadvantages of alternative realizations of weapons systems.

165A. Quantum Optics I (3) II. Yeh

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) I. Yeh
Lecture—3 hours. Prerequisite: course 165A concurrently. On-hand experience in working with lasers, photomultiplier tubes, and optical filters. The design and construction of quantum systems.

166B. Quantum Optics Laboratory (1) II. Yeh
Lecture—3 hours. Prerequisite: course 165B concurrently. Continuation of course 166A.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. De Groot
Lecture—3 hours; discussion—1 hour. 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
Lecture—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. Current 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 (Wochen in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wochen in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

228A-228B-228C. Properties of Matter (3-3-3) I-II-III. Hoover
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic description of matter; dynamical and equilibrium properties; constitutive, electrical, mechanical and thermal properties.

230A-230B-230C. Structure of Matter (3-3-3) I-II-III.
Yeh
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. DeGroot

271. Optical Methods in Biophysics (3) I. Yemuri
Lecture—3 hours. Prerequisite: Physics 110A-110B, 110C, Chemistry 110A, 110B, or the equivalent. Physics of light-matter interactions used in biological research. Techniques of absorption, ellipsometry, fluorescence, microscopy, and x-ray crystallography. Elastic and inelastic scattering, diffraction, and nonlinear optics are applied to the studies of proteins, nucleic acids, lipids, and supermolecular organizations in biological systems. Offered in alternate years.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. De Groot
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.

289A-J. Special Topics in Applied Science (1-5) I, II, III. The Staff (Wochen in charge)
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) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electrodynamics; (J) Solid State. May be repeated up to a total of 5 units per semester.

290. Seminar (1-2) I, II, III. The Staff (Wochen in charge)
Seminar—1-2 hours. (SU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Stahl in charge)
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Wochen in charge)
Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Wochen in charge)
(SU grading only.)

Livemore (EAL)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wochen in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Software Engineering (3) III. 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 methodologies of design. Problems associated with the software management systems are discussed. Former course 201A.

203A. Computer Architecture (3) I. Vemuri
Lecture—3 hours. Prerequisite: course 103 or the equivalent. Detailed design and organization of computer hardware and associated input and output devices. Topics include logic families, addressing methods, memory design, I/O devices, a survey of various architectural structures, and communication systems. A programming project will be performed.

203B. Computer Architecture (3) II. Vemuri
Lecture—3 hours; research paper and programming project. Prerequisite: course 203A. Topics in computer communication, hardware features to enhance operating systems, and advanced architectures.

204A. Artificial Intelligence (3) II. Blattner
Lecture—3 hours. Prerequisite: courses 101, 106, 111. Concepts required to understand artificial intelligence. Goal reduction, exploiting constraints, control mechanisms, and storing common sense knowledge are introduced. LISP programming language is used. Offered in alternate years.

204B. Knowledge Representation (3) III. Blattner
Lecture—3 hours. Prerequisite: courses 204A, 211, or 212. Representation of knowledge requires some language or communicative medium to describe knowledge about the world. 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. Rodrigue
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. Rodrigue
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. Rodrigue
Lecture—3 hours. Prerequisite: course 205B. Spherical harmonics, Bessel functions, conformal mapping, hypergeometric functions, elliptic functions.

206. Programming Languages (3) I. The Staff
Lecture—3 hours; programming project. Prerequisite: course 106 or the equivalent. Examines topics in language design as the contour model and binding times, abstract data types, functional languages, and syntax analysis.

207. Compiler Construction (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 106, 206B. Syntax-directed translation techniques are used to implement a compiler for a block-structured, high-level programming language. Emphasis given to semantic analysis and code generation.

208A. Operating Systems I (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 106, 203B. Design of an operating system. Emphasis given to mechanisms commonly used to implement systems and the various policy options. Course stresses the kernel design approach.

208B. Operating Systems II (3) II. The Staff
Lecture—3 hours. Prerequisite: course 208A. Concentration on operating system structure, interprocess communication, and issues of naming, error control, protection, synchronization, abstract object representation and encoding, resource management, and measurement in distributed operating systems. Course integrates design goals, problems, and mechanisms.

210A. Numerical Methods in Applied Science (3) I. The Staff
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. The Staff
Lecture—3 hours. Prerequisite: course 210A. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite-difference and finite-element, and spectral Methods; hyperbolic, parabolic, and elliptic systems and nonlinear hyperbolic systems.

210C. Numerical Methods in Applied Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.

212A. Analysis of Algorithms (3) III. The Staff
Lecture—3 hours. Prerequisite: course 111. Investigation of time and space requirements of commonly
used programming tasks, such as searching, sorting, set manipulation, and graph algorithms. NP completeness and intractability also discussed.

213A. Computer Graphics (3) II. Max
Lecture—3 hours. Prerequisite: course 113. Development of algorithms for perspective line drawings of threedimensional objects, as defined by polygons or bicubic patches.

213B. Computer Graphics (3) II. Max
Lecture—3 hours. Prerequisite: course 213A. Emphasis on algorithms to produce color-shaded raster renderings of threedimensional models.

215A. Mathematical Methods in Computer Science (4) III. The Staff
Lecture—3 hours. Prerequisite: course 210A. Mathematical techniques common to advanced computing and scientific computing. Examination of methods, principles, and application to problems in computational physics, applied probability, and operations research.

215B. Mathematical Methods in Computer Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 215A. Emphasis on the mathematical methods utilized in the study of data structures and computer architecture.

216A-G Special Topics in Computer Science (1-5) I, II, III
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.

217A-217B. Computational Science (3-3-3) I, II. The Staff
Lecture—3 hours. Prerequisite: course 205A and 205B (may be taken concurrently). Designed for physical scientists interested in computational science with applications to computational science. Computer organization and architecture, data structures, algorithms, complexity, software environments for scientific visualization, parallel computing.

218A. Signal Processing (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 16A, 121A-121B. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction, linear time-invariant systems, signal space concepts, and probability and random processes. Offered in alternate years.

218B. Signal Processing (3) III. The Staff
Lecture—3 hours. Prerequisite: course 218A. Systems and signals, causality and stability. Z-transforms, DTFT, DFT, IIR, and FIR filters. Adaptive filters, array signal processing, spectral estimation, and image processing. Offered in alternate years.

220. Artificial Neural Networks (3) III. Vemuri
Lecture—3 hours. Prerequisite: course 167. Introduction to artificial neural networks. Content addressable memory, interaction, competition, and resonance. LMS and back propagation algorithms. Comparisons of standard models including perceptrons, multilayered and Hopfield nets. Supervised and unsupervised learning. Offered in alternate years.

222. User Interfaces (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 101, 106 and 103. Design and evaluation of the interface between systems and users. Covers user interaction, input and output devices, file systems, software engineering, and user interface design. Offered in alternate years.

224. Theories of Human-Computer Interaction (3) I. Blatter
Lecture—3 hours. Prerequisite: data structures and basic statistics; a course in user interfaces is desirable. Some basic cognitive science pertaining to computer use is introduced (such as memory, sensory limits, and problem solving) followed by models of human activity, text analysis, different paradigms, computer can use, models of cooperative activity, cultural differences in human-computer interaction, users with disabilities, and adaptive interfaces. Offered in alternate years.

227. Chaos, Fractals and Nonlinear Phenomena (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 265A and 265B. A computational treatment of pervasive instabilities in simulation—"sensitive dependence on initial conditions"—called "chaos." Connecting the second law of thermodynamics to nonlinear systems with "strange attractors," these are generally "fractal" objects with great aesthetic and intellectual appeal.

228A-228B. Properties of Matter (3-3-3) III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 228B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical, and thermal properties.

230A-230B. Structure of Matter (3-3-3) I-III. The Staff
Lecture—3 hours. Prerequisites: courses 205A, 205B, 205C (may be taken concurrently). Classical properties of matter; introduction of quantum mechanics by the concept of an atom; the quantum world; the electronic structure of the atomic nucleus; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

233A-233B. Theory and Applications of Solid-State Physics (3-3-3) I-III. The Staff (Wooten in charge)
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-III. Newcomb

255. Classical Mechanics (3) I. Newcomb
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. Christiansen
Lecture—3 hours. Prerequisite: course 250C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

257. Magnetohydrodynamics (3) III. Newcomb
Lecture—3 hours. Prerequisite: course 234B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation, theory of stability, gyroscopic effects, finite-resistivity effects.

262A-262B-262C. Atomic and Molecular Interactions (3-3-3) I-III. Orel
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 (3-3-3) I-III. Hasse

266A-266B. Laser Physics Laboratory (3-3-3) I-II. Camerson

Engineering: Biological and Agricultural 203

267. Nonlinear Optics (3) III. Hasse

267L. Nonlinear Optics Laboratory (3) III. Hasse
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 construction, stabilized Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation, and spectral laser spectroscopy.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) III. 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 VISV Theory, fluctuations, instabilities and magnetic and inertial confinement systems in controlled fusion.

289A-J. Special Topics in Applied Science (1-5) I, II, III. The Staff (Wooten in charge)
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) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electrodynamics; (J) Solid State. May be repeated up to a total of 5 units per segment.

290 Seminar. (1-2) I, II, III. The Staff (Chair in charge)
Seminar—1 hour. (SU grade only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (SU grade only.)

298A. Group Study (1-5) I, II, III. The Staff
Group study

299 Research. (1-12) I, II, III. The Staff (Chair in charge)
Research

*Course not offered this academic year.*
Courses in Engineering: Biological Systems (EBS)

Lower Division Courses

1. Introduction to Biological Systems Engineering (3) [2/3]
   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.

2. Introduction to Forest Engineering (1) [2/3]
   Lecture—discussion—laboratory—3 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, logging transport, milling and residue utilization. (PMP grading only.)

75. Properties of Materials in Biological Systems (4) [2/3]
   Lecture—3 hours, laboratory—3 hours. Prerequisite: Biological Sciences 1A; Physics SC (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 biodegradable materials. (PMP grading only.)

90C. Research Group Conference in Biological Systems Engineering (1) [2/3]
   The Staff (Chairperson in charge)
   Discussion—laboratory—3 hours. Prerequisite: lower division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (PMP grading only.)

90X. Lower Division Seminar (1-4) [2/3]
   The Staff—1 hour. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

92. Internship in Biological Systems Engineering (1-5) [2/3]
   The Staff (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. (PMP grading only.)

98. Directed Group Study (1-5) [2/3]
   The Staff—1 hour. Prerequisite: Engineering 103A or Water Science 142. Engineering and scientific principles applied to the design of systems; surface and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Water Science 145.)

165. Computer Interfacing and Control (4) [2/3]
   Lecture—3 hours, laboratory—3 hours. Prerequisite: Engineering 100, Engineering 5 or Computer Science Engineering 30. Structured programming in C, digital data acquisition concepts and hardware, analog input/output systems, driver software, and computer control.

170A. Engineering Design and Professional Responsibilities (3) [2/3]
   Lecture—2 hours, laboratory—3 hours. Prerequisite: Engineering 102A, 106A. Introduction to engineering design including professional responsibilities. Emphasis placed on project selection, data sources, specifications, human factors, biological materials, systems, and professional design. Detailed design proposals will be developed for course 170B.

170B. Engineering Projects: Design (3) [2/3]
   Laboratory/discussion—3 hours. Prerequisite: course 170A. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of instructor.

170C. Engineering Projects: Design Evaluation (3) [2/3]
   Laboratory—3 hours. Prerequisite: course 170B strongly recommended. Individual or group projects involving fabrication, assembly and testing of components, devices, structures or systems designed to solve specific problems in agriculture or forestry. Projects selected by the instructor from those designed in course 170B.

175. Rheology of Biological Materials (3) [2/3]
   Lecture—3 hours. Prerequisite: Chemical Engineering 150A or Engineering 103A; and Engineering 105A or Chemical Engineering 111. Introduction to biofluids 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).

190C. Research Group Conference in Biological Systems Engineering (1) [2/3]
   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. (PMP grading only.)

190X. Upper Division Seminar (1-4) [2/3]
   The Staff—1 hour. Prerequisite: consent of instructor. In-depth examination of a special topic in a small group setting.

192. Internship in Biological Systems Engineering (1-5) [2/3]
   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. (PMP grading only.)

198. Directed Group Study (1-5) [2/3]
   The Staff—1 hour. Prerequisite: consent of instructor. (PMP grading only.)

199. Special Study for Advanced Undergraduates (1-5) [2/3]
   Staff—1 hour. Prerequisite: consent of instructor. (PMP grading only.)

Graduate Courses

215. Soil-Machine Relations in Tillage and Traction (3) [2/3]
   Lecture—3 hours. Prerequisite: course 114; Civil and Environmental Engineering 171 and Soil Science 100 recommended. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analysis of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

216. Energy Systems (3) [2/3]
   Lecture—4 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.

218. Solar Thermal Engineering (3) [2/3]
   Lecture—3 hours. Prerequisite: consent of instructor. Familiarity with FORTRAN language. Analysis and design of solar energy collection systems. Sun-earth

220. Pilot Plant Operations in Aquacultural Engineering (3) [I]. Pedrahita Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Agricultural Engineering Technology 161A-161B. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in alternate years.

231. Mass Transfer in Food and Biological Systems (3) [I]. Krotcha 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 food and controlling release of biologically active compounds. Former course Agricultural Engineering 286C.

235. Advanced Unit Operations Process and Food Engineering (3) [II]. Rumsey Lecture—3 hours. Prerequisite: course in food or process engineering; familiarity with FORTRAN language. Analysis and design of food and crop processing operations. Steady state and dynamic mass and heat transfer models for operations such as drying, fermentation, and computer programming on College of Engineering VAX.

237. Thermal Process Design (3) [III]. Merson Lecture—2 hours; discussion—1 hour. Prerequisite: Food Science and Technology 150 recommended. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Former course Agricultural Engineering 286B.

239. Magnetic Resonance Imaging in Biological Systems (3) [III]. 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. Former course Agricultural Engineering 286E. Offered in alternate years.

240. Infiltration and Drainage (3) [III]. Grimmer Lecture—2 hours; laboratory—2 hours. Prerequisite: Soil Science 107; Water Science 140. Aspects of multiphase flow in soils and their application to infiltration and drainage. Gas phase transport and entrapment during infiltration and transport of contaminants with nonlinearity, capillarity, and evapotranspiration considered. Offered in alternate years.

241. Sprinkler and trickle Irrigation Systems (3) [III]. Hille Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145. Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions.

242. Hydraulics of Surface Irrigation (3) [III]. Wallender Lecture—3 hours. Prerequisite: a course in differential and integral calculus; a course in hydraulics or fluid mechanics including some open-channel flow; a course in irrigation principles. 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.

245. Management of Wastes from Biological Production Systems (3) [II]. Pedrahita Lecture—3 hours. Characterization of wastes from livestock, crop residues and food processing. Study of methods of collection, treatment, and disposal of these wastes. Offered in alternate years.

280. 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.

285. Design and Analysis of Engineering Experiments (4) [II]. Upadhyaya 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 will be assigned.

270. Modeling and Analysis of Biological and Physical Systems (3) [III]. Upadhyaya, T. Rumsey Lecture—3 hours. Prerequisite: Civil Engineering 218A. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within Agricultural Engineering. Offered in alternate years.

275. Physical Properties of Biological Materials (3) [III]. Chen Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, such as mechanical, optical, 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]. The Staff Variable 1-5 S. Prerequisite: Consent of instructor. Special topics in: (A) Animal Systems Engineering; (B) Environmental Quality; (C) Food Engineering; (D) Forage Engineering; (E) Irrigation and Drainage; (F) Plant Production and Water Use; (G) Postharvest Engineering; (K) Sensors and Actuators. May be repeated for credit when topic differs.

290. Research Methods in Biological Systems Engineering (2) [I]. Giles Lecture—1 hour. Prerequisite: graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Research funding. Record keeping and patents. Use of computer in experiments and computations. Graphical analysis. Oral and written presentation of research results, manuscript preparation, submission and review.

290A. Graduate Research Conference (1) [I], (II), (III). The Staff Lecture—Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (SU 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. (SU grading only.)

298. Group Study (1-5) [I], (II), (III). The Staff Lecture—1-5 hours. May be repeated for credit. (SU grading only.)

299. Research (1-12) [I], (II), (III). The Staff (Hills in charge)

309. Supervised Teaching in Biological and Agricultural Engineering (1-3) [I], (II), (III). Singh Laboratory—1-3 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.

Professional Course

390. Supervised Teaching in Biological and Agricultural Engineering (1-3) [I], (II), (III). Singh Laboratory—1-3 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.

*Course not offered this academic year.

Engineering: Chemical

205.

Engineering: Chemical

(College of Engineering)

Brian G. Higgins, Ph.D., Chairperson of the Department

Department Office, 3092 Bailer Hall (916-752-0400; FAX: 916-752-1031)

Faculty

Nicholas L. Abbott, Ph.D., Assistant Professor
Roger B. Boulton, Ph.D., Professor (Chemical Engineering, Volatilization and Encapsulation)
Stephanie R. Dungan, Ph.D., Assistant Professor (Chemical Engineering, Food Science and Technology)
Bruce C. Gates, Ph.D., Professor
Brian G. Higgins, Ph.D., Professor
Alan P. Jacobsen, Ph.D., Professor
David F. Katz, Ph.D., Professor (Chemical Engineering, Obstetrics and Gynecology)
Benjamin J. McCoy, Ph.D., Professor
Karen A. McDonald, Ph.D., Assistant Professor
Ahmet N. Palaoglu, Ph.D., Associate Professor
Ronald J. Phillips, Ph.D., Assistant Professor
Robert L. Powell, Ph.D., Professor
David D.Y. Ryu, Ph.D., Professor
Pieter Stroewe, Sc.D., Professor
Stephen Whitaker, Ph.D., Professor, Academic Senate Distinguished Teaching Award

Emeriti Faculty

Richard L. Bell, Ph.D., Professor Emeritus
J. M. Smith, Sc.D., Professor Emeritus

Courses in Engineering: Chemical (ECH)

Lower Division Courses

1. The Scope of Chemical Engineering (1) [I]. 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. (PIN grading only)

90X. Lower Division Seminar (1) [I], (II), (III). The Staff Seminar—1 hour. Examination of a special topic in a small setting.

98. Directed Group Study (1-5) [I], (II), (III). The Staff (Chairperson in charge) Prerequisite: consent of instructor and lower division standing. (PIN grading only)

99. Special Study for Undergraduates (1-5) [I], (II), (III). The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PIN 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.
151. Material Balances (3) I. Whitaker
  Lecture—3 hours. Prerequisite: Chemistry 110A, Chemistry 128B (may be taken concurrently), Engineering 1. 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) I, II. 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 150A. 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—12 hours. Prerequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155B. Chemical Engineering Laboratory (4) III, IV. The Staff
  Laboratory—12 hours. Prerequisite: courses 154B, 155A. Continuation of 155A.

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) I, II. III. The Staff
  Laboratory—3 hours; discussion—1 hour. Prerequisites: course 157. Laboratory experiments in control system design and analysis.

158A. Economics and Optimization of Chemical Processes (3) I. Palazoglou

158B. Process Equipment Design (3) II. Palazoglou
  Lecture—3 hours. Prerequisite: course 158A. Design of chemical process equipment. Equipment cost estimation techniques.

158C. Chemical Plant Design (3) III. Palazoglou
  Lecture—3 hours. Prerequisite: course 158B. Conceptual design of chemical processes. Design, cost estimating, 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 225F. Chemical engineering applications of partial differential equations and systems of linear equations and operational calculus.

161. Biochemical Engineering Fundamentals (3) III. McDonald
  Lecture—3 hours. Prerequisite: Chemistry 128A, Mathematics 225F, and Microbiology 102, or consent of instructor. Enzyme and microbial kinetics, bioreactor design and analysis, transport phenomena in bioreactors, and downstream processing.

163. Chemical Engineering in Integrated Circuit Precipitation Technology (4) I. The Staff
  Lecture—4 hours. Prerequisite: course 154A (concurrently); Chemistry 128B. Manufacture of semiconductor devices, integrated circuits, magnetic bubble memories, tapes and disks involving application of chemical engineering processing technologies. The chemistry and engineering of the industrial fabrication of modern circuits and devices.

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/N 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. The Staff (Chairperson in charge)
  Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
  Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

206. Biochemical Engineering (3) II. Ryu
  Lecture—3 hours. Prerequisite: course 161 and Microbiology 2, 3; Biological Sciences 102, 103, and Food Science and Technology 205 recommended. Interaction of biochemical engineering, microbiology, and biochemistry. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitator, mass transfer and development of biological systems, production and recovery, enzyme technology. Offered in alternate years.

222. Enzyme Engineering (3) II. Ryu
  Lecture—3 hours. Prerequisite: Biochemistry 123 or consent of instructor; Biochemistry 133, Food Science and Technology 110A-110B, Chemical Engineering 151, Microbiology 102 recommended. 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 and drug engineering in alternate years.

246. Advanced Biochemical Engineering (3) III. Ryu
  Lecture—2 hours. Prerequisite: course 161, Chemical Engineering 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. Advanced Thermodynamics (4) I. The Staff
  Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B or Engineering 105B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

253A. Advanced Fluid Mechanics (4) I. The Staff
  Lecture—4 hours. Prerequisite: course 150A, 150B, and 259 (may be taken concurrently) or the equivalent. Kinematic 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

253C. Advanced Mass Transfer (3) II. The Staff
  Lecture—3 hours. Prerequisite: courses 154A, 154B, and 269 (may be taken concurrently) or the equivalent. Kinematic and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer. Applications to binary and ternary systems. Theory of diffusion with reaction, and the effects of concentration.

254. Colloid and Surface Phenomena (4) III. Strove
  Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 110C or the equivalent. Colloid and surface phenomena occur in a wide spectrum of problems encountered in engineering and science. Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems.

256. Applied Kinetics and Reactor Design (4) III. The Staff
  Lecture—4 hours; discussion—1 hour. Prerequisite: courses 253A, 253C. Application of kinetics and molecular transport rates to the design of chemical reactions with emphasis on homogeneous systems.

259. Advanced Chemical Engineering Analysis (4) III. The Staff
  Lecture—4 hours. Prerequisite: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment. Micromorganisms, crystallization, aerosol processes, and functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and filtration. Offered in alternate years.

261. Separation Processes: Particulate Systems (3) III. The Staff
  Lecture—3 hours. Prerequisite: course 154B. Analysis and design of chemical separation processes: distillation, extraction, adsorption, chromatography. Finite difference equations, axisymmetric annular dispersion models, probability and random walk theories, method of characteristics, moment analysis, optimization. Offered in alternate years.

262. Transport Phenomena in Multiphase Systems (3) III. Whitaker
  Lecture—3 hours. Prerequisite: course 253C. Heat, mass, and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Development 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) III. McCoy
  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.

264. Introduction to Hydrodynamic Stability Theory (4) II. Higgins Lecture—4 hours. Prerequisite: course 253A. Mathematical structure for studying the stability of fluid motions. Introduction to bifurcation theory and the spectral problem for linear stability. Offered in alternate years.

257. Advanced Process Control (3) II. McDonald, Palazoglu 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.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. (SU graded 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. (SU graded only.)

291. Seminar in Multiphase Transport Phenomena (1) I, II. The Staff Seminar—1 hour. Prerequisite: graduate or senior standing. Introduction to theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with adsorption and reaction, and heat transfer in multiphase systems with chemical reaction. (SU graded only.)

292. Seminars in Process Dynamics and Control (1) II. Palazoglu Seminar—1 hour. Prerequisite: graduate or senior standing. Theoretical and practical aspects of process control will be addressed. Topics will cover controller analysis and synthesis of linear and nonlinear systems including boiler, distillation columns and others as well as dynamic modeling of such processes. (SU graded only.)

298. Group Study (1-0) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU graded only.)

299. Research (1-12) I, II. III. The Staff (Chairperson in charge) (SU graded only.)

Professional Course

300. Teaching of Chemical Engineering (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: qualifications and acceptance as teaching assistant and/or associate in chemical engineering. Participation as a teaching assistant or associate 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. (SU graded only.)

Engineering: Civil and Environmental

(College of Engineering)

Mervin R. Ramsey, Ph.D., Chairperson of the Department (916-752-5069)
Daniel P. Y. Chang, Vice-Chairperson of the Department (916-752-2537)
Department Office, 206 Walker Hall (916-752-0566)

Faculty

Kandiah Arulanandan, Ph.D., Professor
Takashi Asano, Ph.D., Adjunct Professor
Ross W. Boulanger, Ph.D., Assistant Professor
Roh Chi, Ph.D., Assistant Professor
Daniel P. Y. Chang, Ph.D., Professor
Yannis F. Dafalias, Ph.D., Professor
Jeanne L. Darby, Ph.D., Assistant Professor
Johannes J. DeVries, Ph.D., Lecturer
Leonard R. Herget, Ph.D., Professor, Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
L.M. Idriss, Ph.D., Professor
Paul J. Jovais, Ph.D., Professor
M. Levent Kavvas, Ph.D., Professor
Ian P. King, Ph.D., Professor
Peyuch Kitamura, Ph.D., Professor
Bruce L. Kutter, Ph.D., Associate Professor
Bruce E. Larock, Ph.D., Professor
Jay R. Lund, Ph.D., Associate Professor
Miguel A. Marfil, Ph.D., Professor (Civil and Environmental Engineering; Land, Air and Water Resources)
Patricia L. Mokhtarian, Ph.D., Assistant Professor
Carlos E. Puente, Ph.D., Assistant Professor (Civil and Environmental Engineering; Land, Air and Water Resources)
Otto G. Raabe, Ph.D., Professor in Residence (Civil and Environmental Engineering; Laboratory for Energy-Efficient Health Research)
Mervin R. Ramsey, Ph.D., Professor
Karl M. Romstad, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Edward D. Schroeder, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Daniel Sperring, Ph.D., Professor (Civil and Environmental Engineering; Environmental Studies)
George Tchobanoglous, Ph.D., Professor
Emeriti Faculty

Don O. Brush, Ph.D., Professor Emeritus
Robert H. Brunner, Ph.D., Professor Emeritus
James A. Cherry, Ph.D., Professor Emeritus
James R. Hutchinson, Ph.D., Professor Emeritus
Ray B. Krone, Ph.D., Professor Emeritus
Gerald T. Orob, 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

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 the role of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP graded only.)

10. Introduction to Surveying (3) III. The Staff (Chairperson in charge) 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, traverses, computations, horizontal and vertical curves; astronomical observations and calculations for latitude, longitude, azimuth, and time.

30. Engineering a Better Environment (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodologies of environmental engineering. Topics presented include environmental quality, environmental radiation and radioactivity, wastes management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physics majors. General Education credit: Nature and Environment.

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 graded 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 graded 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 graded 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 civil engineering. Statistical analysis of civil engineering experimental and field data. Introduction to stochastic processes models of civil engineering systems.

131A. Structural Analysis (3) I, II. Romstad Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B. Open to Engineering students only. Elastic structural analysis of determinate and indeterminate trusses, beams, and frames. Calculation of displacements. Methods of virtual work, moment distribution, slope deflection, moment distribution.

131B. Matrix Structural Analysis and Introduction to Finite Element (3) I, II. Ramzy Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B. Open to Engineering students only. Matrix formulation and computer analysis of statically indeterminate structures. Introduction to finite element methods for elasticity and bending problems.

132A. Structural Design: Metallic Elements (3) I, II. Ramzy Lecture—3 hours. Prerequisite: Engineering 104B (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.

132B. Structural Design: Concrete Elements (3) I, II. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic and ultimate strength design procedures for columns and rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond.

132C. Structural Design: Timber Elements (3) III. Ramzy Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

133. Properties of Concrete (4) I. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35; senior standing. Physical and chemical properties of cements, the properties of fresh concrete, the ingredients of concrete, the desirable characteristics of hardened concrete, and how to obtain them. Mix design methods.

134. Analysis and Design of Buildings (3) III. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132A; 132B (may be taken concurrently). Dead and live loading; earthquake and wind forces. Approximate analyses of building frames; concrete building design. Plastic analysis of metal frames.

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.

*Course not offered this academic year.
Graduate Courses

201. Introduction to Theory of Elasticity (3) I. Herrmann
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104B. 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.

202. Buckling of Columns and Plates (3) II. I. Herrmann
Lecture—3 hours. Prerequisite: courses 201 and 221. Analysis of the buckling behavior of structural members: buckling of columns, lateral buckling of beams, nonlinear bending and lateral-torsional buckling of beam-columns, stiffness of structural frames, buckling strength and ultimate strength of plates.

203. Inelastic Behavior of Solids: Plasticity (3) II. Dallas
Lecture—3 hours. Prerequisite: course 201, fundamentals of plasticity, the concept of yield, strain-hardening, and the associated constitutive equations for elastic-plastic solids. Solution of selected practical problems involving elastic-plastic, strain-hardening materials. Slip line field theory and limit analysis. Offered in alternate years.

204. Viscous Behavior of Solids (3) III. Dallas
Lecture—3 hours. Prerequisite: course 201, fundamentals of viscoelasticity and viscoplasticity for solids. Characterization of engineering materials, e.g., concrete, soil, asbestos, rubbers, etc. General analysis procedures for problems in viscoelasticity. Offered in alternate years.

205. Continuum Mechanics (3) II. Dallas
Lecture—3 hours. Prerequisite: course 203 or 204. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear thermomechanics and thermodynamics. Solution of three-dimensional problems. Offered in alternate years.

211. Advanced Matrix Structural Analysis (3) II. Romstad
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 131A, and course 131B or consent of instructor. Computer analysis of complex frameworks by the displacement method; treatment of tapered, curved and beam on elastic foundation members, partially rigid connections; nonlinear and stability analysis; introduction to structural optimization.

212A. Finite Element Procedures in Applied Mechanics (3) III. The Staff
Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 126A:126B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures. Galerkin and stationary principal functions. Solution 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 approximate procedures.

212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) III. Narrain
Lecture—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and nonlinear, one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and to plate and shell theories.

212C. Finite Elements: Application to Fluid Problems (3) II. Barlow
Lecture—3 hours. Prerequisites: 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. Prerequisites: 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) III. 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.

223. Advanced Topics in Concrete Structures (3) I. Ramey and Taylor
Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete; design for torsion of structural concrete; seismic requirements; two-way slabs.

223. Advanced Design of Steel Structures (3) II. Ramey and Taylor
Lecture—3 hours. Prerequisites: courses 132A and 131A. Design considerations for steel column and frame buckling; steel plate girder design; steel-concrete composite design; design of connections. Design basis follows the AISC's, LRFD, and ASD specifications.

240. Water Quality (3) II. Staff
Lecture—3 hours. Prerequisite: courses 141 and 142. Quality requirements. Water sources and distribution; quality of surface water and groundwater; water sources and uses. Pollutants, methods for water quality modeling.

242A. Air Quality (3) III. Chang
Lecture—3 hours. Prerequisite: Engineering 105A, courses 141 and 148, or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.

242B. Airborne Particles Laboratory (1) I. Raabe
Laboratory—3 hours. Prerequisite: course 242B (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods of generation and characterization of airborne particles. Offered in alternate years.

243A. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: course 248A. Characterization of water 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. Consequences of Course 243A.

244. Environmental Quality Modeling (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 240 or the equivalent. Numerical modeling of environmental water quality, with emphasis on mathematical models of quality, their structure, capacities and limitations, sensitivity and reliability as analytical and predictive tools. Offered in alternate years.

245. Applied Environmental Chemistry (4) I. Darby
Lecture—4 hours. Prerequisite: Engineering 105A, courses 140 and 140L, or the equivalent. Chemistry 2A, 2B, or the equivalent. Recommended. Chemistry of natural and polluted waters. Chemical kinetic and equilibrium principles, thermodynamics, carbonate systems, precipitation and dissolution, coordination chemistry, oxygen reduction, and interfacial phenomena.

246. Pilot Plant Laboratory (3) II. Darby
Lecture—1 hour; laboratory—5 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

247. Airborne Particles and Scavenging Mechanisms (3) I. Raabe
Lecture—3 hours. Prerequisite: course 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. Former course 242B.

*Course not offered this academic year.
258. Transportation Planning in Developing Countries (3) A. S. S. Jain 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) S. Kimura Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigational and guidance, telecommunication and information systems, design and analysis, project management, implementation/evaluation, and criteria for movable bed models. Stable channel design. Offered in alternate years.

260. 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.

264A. Applied Stochastic Methods in Engineering (3) I. H. Kavas Lecture—3 hours. Markov processes and their applications to modeling of engineering systems. Review of differential equations, matrix theory, probability, information theory, Markov chains, and stochastic processes. Applications in system reliability, control and communication, queuing and inventory, population and ecological models, and spatial statistics. Offered in alternate years.


266. Water Resources Management (3) I. Lund Lecture—3 hours. Hydrologic and hydraulic principles; classification of basic probability (course 114 or the equivalent) and courses 141 and 142; course 153 recommended. Operation, maintenance, and modification of existling water resource systems; economic, financial, technical, and institutional considerations; decision, optimization, and multi-objective analysis.

268. Public Works Economics (3) II. Lund Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural 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.

269. Water Supply and Hydroelectric Power Planning (3) II. The Staff Lecture—3 hours. Prerequisite: courses 142 and 152 or the equivalent. Analysis of drought phenomena and low streamflows; water demand; risk and reliability analysis; conjunctive supply and conservation; planning alternatives. Capacity and energy determination in power generation; energy alternatives; market requirements and load studies; analysis of system power and supply; regulatory considerations. 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, and economics to water resources planning. Design of water resources plan for city or region. Study tour of water resources facilities. Offered in alternate years.


273. Water Resource Systems Engineering (3) I. Marino Lecture—3 hours. Prerequisite: courses 114 and 153 or the equivalent. 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.


278. Hydrodynamics (3I). II. Larock Lecture—3 hours. Prerequisite: course 141. Equations for conservation of mass, momentum, energy, vorticity, circulation; stream functions, velocity potential; flows by superposition and conformal mapping; free streamline applications, gravity effects; introduction to wave motion. Offered in alternate years.


281B. Advanced Soil Mechanics (3I). II. Kutter Lecture—2 hours; laboratory—3 hours. Prerequisite: course 281A. Site investigation methods: CPT, SPT, pressure meter, vane, settlement, principles of properties, slope stability, including seepage pressures and earthquake effects. Centrifuge modeling. 283. Physicochemical Influences and In Situ Evaluation of Soil Behavior (3I). II. Arulananandam 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 scale methods of characterization of soils, quantification of soil structure, and rotating cylinder tests to evaluate soil erosion.


286. Advanced Foundation Design (3I). III. Idries Lecture—3 hours. Prerequisite: course 171. Design and analysis of load-bearing elements, settlement, load-bearing: load on buried conduits, lateral load-bearing capacity, and foundation design; and other related topics.

287. Geotechnical Earthquake Engineering (3I). Idries Lecture—3 hours. Prerequisite: course 138, 281A. Characteristics of earthquake ground motions; empirical and simulation procedure for estimating these motions; local site response; liquefaction potential; residual strength and stability consideration; generation and dissipation of pore water pressures; settlement.

288. Earth and Rockfill Dams (3II). III. Idries Lecture—3 hours. Prerequisite: course 281A, 281B. Site selection; preliminary design considerations; layout; seismic effects including considerations of fault movements; construction; instrumentation; maintenance.

289A. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Lecture, laboratory, co-ordination. Prerequisite: consent of instructor. Directed group study of special topics with 3-5 hours sections in (A) Environmental Engineering, (B) Hydraulic 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.

289B. Sanitary Engineering Systems (4) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour. Discussion of current graduate research in environmental engineering, and guest lectures by consulting engineers. Oral presentation of individual study. Course required of graduate degree candidates. (Su grade only)

290C. Graduate Research Group Conference (1I), II, III. Chairperson in charge Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (Su grade only).

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (Su grade only.)
Division of Computer Science
Peter Linz, Ph.D., Acting Chairperson of the Department
Division Office, 2063 Engineering Unit II (918-752-7004)

Faculty
Sergei A. Kivalov, Ph.D., Assistant Professor
Mary A. Powers, Ph.D., Assistant Professor
Matthew K. Farnell, Ph.D., Assistant Professor
Mehrdad Arghaz, Ph.D., Associate Professor
Daniel Gifford, Ph.D., Associate Professor
Kenneth L. Joy, Ph.D., Associate Professor
Robert M. Kelly, Ph.D., Professor
Lawrence T. Kuo, Ph.D., Professor
Karl LeVitt, Ph.D., Professor
Peter Linz, Ph.D., Professor
Charles U. Martel, Ph.D., Professor
Norman S. Matloff, Ph.D., Professor
Brian R. Mihaljevic, Ph.D., Associate Professor
Ronald A. Olsson, Ph.D., Associate Professor
Arvin Park, Ph.D., Assistant Professor
Jarred Prentiss, Ph.D., Assistant Professor
Armand B. Pires, Ph.D., Assistant Professor
Marfred G. Ruschitzka, Ph.D., Professor
Richard F. Walters, Ph.D., Professor

Courses in Engineering: Electrical and Computer Engineering (EEC)
(Courses in Electrical and Computer Engineering (EEC) are listed below; courses in Computer Science Engineering (CSE) are listed immediately following.)

Lower Division Courses
1. Introduction to Electrical and Computer Engineering (I) (3). The Staff (Chairperson in charge)
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. (IP/EN grading only.)
2. Computer Structure and Assembly Language (2). I, II, III. Redlin, Soderstrand, Wilken Lecture—3 hours; computer workshop—3 hours. Prerequisite: Computer Science Engineering 30 or 35. Introduction to computer architecture: machine language, assembly language, macros and conditional macros, subroutines/parameter passing, input/output programming, interrupt and trap, direct-memory access, absolute and relocatable code, re-entrant code; program development in an operating system.

89A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

92. Internship in Electrical and Computer Engineering (1) 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. (IP/EN grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (IP/EN grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (IP/EN grading only.)

*Course not offered this academic year.

Upper Division Courses
100. Circuits II (5) I, II. The Staff Laboratory—3 hours; lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 100 or equivalent in the theory and application of analog circuits. Students who have completed Engineering 100 may receive only 3.5 of credit.

106. Introduction to Image Processing and Computer Vision (4) I. Reed, Ford, Algazi, Levy Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Imaging geometry, transforms and sampling, enhancement, restoration, and conversion; image compression; time- and frequency domain pattern recognition; segmentation; multi-resolution analysis.

110A. Electronic Circuits I (4) I, II. Spencer, Haley, Hurst, Lewis Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17, courses 130 and 140A, course 180A (may be taken concurrently). Applications of operational amplifiers, modeling of active devices, design of small-signal linear amplifiers, design of basic logic gates.

110B. Electronic Circuits II (4) I, II. Spencer, Haley, Hurst, Lewis Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A. Analysis and design of amplifier output stages, analysis of frequency response of amplifiers, analysis and design of multistage and feedback amplifiers, stability and compensation of feedback systems, oscillators, introduction to analog-to-digital and digital-to-analog converters.

111A. Electronic Circuits Laboratory (2) I. Spencer, Hurst, Lewis, Current Lecture—discussion—1 hour; laboratory—3 hours. Prerequisite: courses 100, 140A, 150A; course 110A (concurrently recommended); course 140B recommended (may be taken concurrently). Laboratory measurement techniques. Spectral analysis. Transistor model parameter value extraction. Transistor amplifier design.

111B. Electronic Circuits Laboratory (2) I. Spencer, Hurst, Lewis, Current Lecture—discussion—1 hour; laboratory—3 hours. Prerequisite: courses 110A, 111A, 150A; course 110B (concurrently recommended); course 140B recommended. Design, analysis, and evaluation of logic circuits, multi-stage and feedback amps, and oscillators.

114. Analog Integrated Circuits (3) I. Hurst, Spencer, Current, Lewis Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110S, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis is on bipolar transistor circuits. Single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers. (Former course 114A)

118. Digital Integrated Circuits (3) III. Hurst, Current, Oklobdzija Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of digital integrated circuits. Emphasis is on MS/CMOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs. (Former course 114B.)


130B. Introductory Electromagnetism II (4) I, II, III. Dienes, Fink, 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. Fink, Dienes Lecture—3 hours. Prerequisite: course 130B or the equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular waveguides. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Travelling wave amplifiers.

131B. Electromagnetic Fields and Waves (3) II. Fink, Dienes Lecture—3 hours. Prerequisite: course 131A or the equivalent. Fiber optics. Helix and waveguide structures. Wave propagation in a plasma. Microwave antennas and arrays. (Former course 115B.)

143C. Electromagnetic Fields and Waves (3) III. Fink, 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—4 hours, laboratory—2 hours. Prerequisite: course 132A or the equivalent. Analysis of electrical and magnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave interconnections, and circuits of electromagnetic energy transfer systems, the scattering parameters.

132B. High-Frequency Systems, Circuits and Devices (5) II. Branner Lecture—4 hours, laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Receive high frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.


145A. Solid-State Electronics (3) III. Bower, Churchill, 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 heterostructures devices.

145B. Solid-State Electronics (3) I, III. Fink, Haley Lecture—3 hours. Prerequisite: course 145A. Magnetism and superconductivity. Design of devices and the associated circuits utilizing the magnetic and superconducting properties of solids. Magnetic devices studied include masers and magnetic media: disk, tape and bubble. Superconducting devices studied include Josephson junctions, SQUIDs, and SC microcircuits.

146A. Integrated Circuits Fabrication (3) I. Hunt, Bower Lecture—2 hours, laboratory—3 hours. Prerequisite: course 140B. Basic fabrication processes for oxide semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work taken together in production of gate oxide PMOS test chips which will undergo parametric and functional testing. (Formerly course 115A.)

146B. Advanced Integrated Circuits Fabrication (3) II. Hunt, Bower Lecture—2 hours, laboratory—3 hours. Prerequisite: course 145A. Fabrication processes for CMOS VLSI. Lab projects examine deposition of thin film, ion implantation, process simulation, anisotropic plasma etching, sputter metalization, and C-V analysis. Topics include isolation, projection alignment, epitaxial growth, thin gate oxide, and high thermal annealing. (Former course 115B.)


150A. Introduction to Signals and Systems I (4) I, II. Abdel-Ghaffar, Chang, Ford, Levy Lecture—4 hours. Prerequisite: Engineering 17. Characterization and analysis of continuous-time linear systems. Fourier series and transform methods. Introduction to communication systems. Transformer functions and block diagrams. Elements of feedback systems. Stability of linear systems. (Not open to students who have taken Electrical and Computer Engineering 112.)

150B. Introduction to Signals and Systems II (4) II, III. Ha, Ford, Friedlander, Mayne, Wang Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Noise and analysis of discrete-time systems. Difference equations and digital models. Z-transform analysis methods. Discrete and fast Fourier transforms. Introduction to digital filter design. (Not open to students who have taken Electrical and Computer Engineering 151.)


157B. Control Systems (3) III. Ha, Dorf Lecture—2 hours; discussion—3 hours. Prerequisite: course 157A. Control system optimization and compensation techniques, digital control theory. Laboratory includes Stevo system experiments and computer simulation studies.


165. Modulation, Coding, and Noise (3) II. Alzaga, 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 modulation. Signaling, noise, signal-to-noise ratio, probability of error, matched filters, and Wiener filters. Introduction to information theory and coding.

166. Digital Communications: Satellite, Microwave, Cable (3) I. Feher Lecture—3 hours; laboratory—1 hour. Course 166. Introduction to digital communications by satellite, microwave, and cable systems. Baseband signal processing techniques for digital MDEM (modulators-demodulators). Principles of modulation of QPSK, 64-QAM, and other MDEM in TDMA and SDMA satellite and terrestrial microwave systems.

167. Telecommunications Measurements and Instrumentation (3) II. Feher Lecture—3 hours. Prerequisite: course 160. Measurements and instrumentation for telecommunications and signal processing systems. Analysis of bit error rate, noise and jitter measurement uncertainties. Digitized PCM video and voice spectral data and measurements. Expert (artificial intelligence) applications. In-class experimental demonstrations.

170. Introduction to Computer Architecture (4) I, II, III. Oklobdzija, Redlin, Wilken, Akella Lecture—3 hours; discussion—1 hour. Prerequisite: course 70 or Computer Science Engineering 50; course 164A. Survey of relationship and interaction of various parts of computer systems including instruction sets, processing and control units, particular microprogrammed control units, buses, input-output, arithmetic and logic units, and memory system hierarchies. (Not open to students who have taken Electrical and Computer Engineering 171.)

172. Microcomputer-Based System Design (4) I, II. Chang, Oklobdzija, Akella, Redlin, Wilken Lecture—4 hours, laboratory—2 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 180A; course 180B concurrently recommended. Review of 8086/8088 microprocessor architecture, bus-based system architecture, peripheral chips architecture, I/O interface design, software I/O device drivers; interrupt driven system design; MS-DOS operating system based system design; real-time embedded system design.

173. Applications of Object-Oriented Programming (4) I. Wang Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science Engineering 30 or 35, and course 70 or Computer Science Engineering 50. Introduction to the modern programming paradigms of object abstraction and object oriented programming for engineering applications such as robotics, image processing, etc. Introduction to object-oriented programming in C++ language: The techniques of partitioning an application into pieces by defining new types that match the concept of the application. (Not open to students who have taken Electrical and Computer Engineering 165.)

174. Microprocessor-based Instrumentation Systems (4) I, II. Oklobdzija, Redlin, Wilken, Akella 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 microcomputer 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 end safety. (Not open to students who have taken Electrical and Computer Engineering 150.)

180A. Digital Systems I (5) I, II, III. Oklobdzija, Redlin, Wilken Lecture—3 hours; laboratory—6 hours. Prerequisite: course 100 or Engineering 100. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and latches, digital machine design; computer-aided design (CAD) methodologies and tools. (Not open to students who have taken Electrical and Computer Engineering 176.)

180B. Digital Systems II (5) I, II, III. Oklobdzija, Redlin, Wilken Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 110A, and 180A. Multi-input/output sequential digital systems; timing/pulse circuits: TTL, CMOS, ECL, logic elements; asynchronous logic, A-D converter design; system noise grounding, shielding, crosstalk, reflection; memory systems; CAD with PLD/PAL; CAD with Xilinx FPGA. (Not open to students who have taken Electrical and Computer Engineering 177.)

189A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff Chairperson in charge; Lecture, laboratory, or seminar. 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) Logic Systems; (I) Signal Processing; (J) Image Processing; (K) High-Frequency Devices and Electronic 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 is different.

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 (1-1) I, II, III. Soderstrand Laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50; course 100 or Engineering 100 course 180A recommended. Design of a robotic mouse for the IEEE Micromouse competition. Course offering subject to student demand and availability of resources. Limited enrollment. May be repeated for credit. (P/NP grading only; Deferred grading only, pending completion of three-course 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) (P/NP grading only.)

Graduate Courses


205. Introduction to Optical Information Processing (3) I. Knossen Lecture—3 hours. Prerequisite: courses 230 and 250 recommended. Review of the scalar theory of diffraction and of two-dimensional Fourier transforms, from which the foundations of the frequency analysis of imaging systems will be developed. Image processing techniques will be examined, including the theory and application of holography. Introduction to optical computing. Offered in alternate years.

206. Digital Image Processing (4) I. Algazi, Ford, Poletti Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Two-dimensional system 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.


211. Advanced Analog Circuit Design (3) I. Spencer, Current, Hurst, Lewis 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 (3) II. Hurst, Spencer, Current, Lewis Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS integrated circuits, CMOS process, MOS device modeling, passive components, single stage amplifiers, current sources, op amps, compensation, comparators, switched-capacitor filters, and analog-to-digital conversion.


214B. Computer-Aided Circuit Analysis and Design (3) III. Haley, Current Lecture—3 hours. Prerequisite: course 214A. Transient (time-domain) analysis; harmonic analysis; steady-state analysis; time-domain network sensitivities, poles, zeros, ac, dc sensitivities, gradient calculations, design optimization. Extensive computer project.

218A. Introduction to VLSI Circuits (3) I. Current, Hurst, Oklobdzija, Spencer Lecture—3 hours. Prerequisite: courses 110A-110B, 11A-11B, and 210A. Theory and practice of VLSI circuit design and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design example.

218B. Multiprocessor Chip Design (1) II. Current, Hurst, Oklobdzija Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiprocessor chip layouts of projects begin 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: course 218A and 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testability are discussed.


221. Passive Filter Design (3) I. Soderstrand Lecture—3 hours. Prerequisite: courses 100 and 150A. Introduction to the design of passive filters with lumped and distributed elements. Filter specification and design procedures. Theory, design, and synthesis of passive lumped and distributed circuits, passive filters with lumped elements, crystal and ceramic filters, mechanical filters.

222. Active Filter Design (3) I. Soderstrand, Current, Haley Lecture—3 hours. Prerequisite: course 221 recommended. Introduction to the design of active filters with lumped elements and switches. Active filters with lumped RC elements, active-R networks, and switched capacitor filters.

225. RF Amplifiers, Oscillators, Mixers, and Antennas (4) III. Brenner Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B and consent of instructor. Microwave amplifier theory and design including transistor circuit models, stability considerations, noise models and distortion, bias designs. Theory and design of microwave transistor oscillators and mixers. Analysis and design of linear, loop, waveguide, and horn radiators.

226A. Quantum Electronics (3) I. Dienes, Lecture–3 hours. Prerequisite: course 130B and 140B. Some basic concepts of quantum theory, density operator, Hamiltonian, and parity. Electric dipole transition; equation of motion of magnetic dipole; resonant processes, absorption, dispersion and saturation; transient behavior of electric dipole transitions, coupled-amplitude equations and rate equations. Offered in alternate years.

226B. Quantum Electronics (3) II. Dienes, Lecture—3 hours. Prerequisite: course 226A. Lasers, maser, population inversion, threshold requirement, steady-state and transient behavior, Q-switching. Interaction between radiation and phonons. Offered in alternate years.

227A. Microwave Electronics (3) I. The Staff Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwaves, waveguides and cavities. Interaction between electromagnetic fields and the electron charge. Lorentz force law, energy levels in matter and Zeeman splitting. Comparison between conventional and microwave tubes and other new types of microwave oscillators and amplifiers. Offered in alternate years.

227B. Microwave Electronics (3) II. The Staff Lecture—3 hours. Prerequisite: course 227A or the equivalent. Theory of interaction between electromagnetic fields and electronic charge, with applications to electron beam and solid-state devices. Beam formation, velocity and density modulation, plasma oscillation, space charge wave propagation in klystrons. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in alternate years.


230. Electromagnetics (3) I. Dienes, Fink 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.

231. Electromagnetic Theory (3) I. Dienes, Fink, Knossen Lecture—3 hours. Prerequisite: course 131B applied Science Engineering 234A. Advanced topics in electromagnetics, including propagation in anisotropic and nonlinear media. Offered in alternate years.

232A. Advanced Applied Electromagnetics I (3) II. Brenner 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. Brenner Lecture—3 hours; laboratory—3 hours. Prerequisite: course 131B or 132B. Advanced treatment of electromagnetic phenomena with applications to passive microwave devices and antennas. Offered in alternate years.

*Course not offered this academic year.
240. Semiconductor Devices (3) I. Hunt
Lecture—3 hours. Prerequisite: course 140B. Physical principles, characteristics and models of various semiconductor devices including P-N junction and metal–semiconductor field-effect transistors, junction insulated gate field effect transistors. Not open for credit to students who have completed former course 220.

245A. Applied Solid-State Physics (3) II. Fink, Church, Read
Lecture—3 hours. Prerequisites: courses 140B and 240. Physics of solids relevant to solid-state applications. Topics include atomic structure of solids, quantum mechanics of electronic states in crystals, electron dynamics, and transport theory.

245B. Applied Solid-State Physics (3) III. Fink, Hake
Lecture—3 hours. Prerequisite: course 245A. Theory and application of magnetism and superconductivity. Topics in magnetism include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of magnetic elements. Topics in superconductivity include Josephson junctions, SQUIDS, and SC microcircuits.

245C. Applied Solid-State Physics (3) III. Hake, Harlow
Lecture—3 hours. Prerequisite: course 245A. The physics of solids and quantum-confined systems relevant to applications of fundamental optical processes. Topics include elementary excitations, radiative and non-radiative recombination, high-density exciton, stimulated emission, and excitonic effects in bulk material as well as quantum well, wires, and boxes. Offered in alternate years.

246. Advanced Projects in IC Fabrication (3) III. Current, Hunt, Spencer, Smith
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. (Former course 241B.)

247. Advanced Semiconductor Devices (3) I. Churchill, Bowker, Hunt
Lecture—3 hours. Prerequisite: course 220. Physics of various semiconductor devices, including metal-oxide-semiconductor field-effect transistors (MOSFET), IMPATT diodes, tunneling 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, Chang
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. Gundersen

251. Nonlinear Systems (3) I. Gundersen
Lecture—3 hours. Prerequisite: course 250. Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization.

252. Multivariable Control System Design (3) II. Mayne, Wang

253. Adaptive Systems (3) I. Haig

255. Robotic Systems (3) I. Haig, Wang
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators, Robot motion programming, and control algorithms.

256. Multivariable Feedback Systems (3) III. Gundersen
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, Mayne
Lecture—3 hours. Prerequisites: graduate standing. Advanced topics in the theoretical foundations of optimization and its applications, especially to linear systems theory, stochastic programming, stochastic optimal control, approximation theory for optimization, advanced topics in numerical implementation of algorithms, shape optimization, large scale optimization, semi-infinite and non-differential optimization. Application to engineering design, global optimizations. (Same course as Mathematics 257.)

258A. Optimization I (3) I. Chang, Mayne
Lecture—3 hours. Prerequisites: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimization conditions, linear programming and unconstrained optimization (gradient, Newton, conjugate directions and mirror algorithms), convergence and rate of convergence, selected topics. (Same course as Mathematics 258A.)

258B. Optimization II (3) III. Chang, Mayne
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linearly and nonlinearly constrained optimization problems, feasible directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangians, sequential quadratic programming, selected topics. (Same course as Mathematics 258B.)

259. Optimal Control, Theory and Algorithms (3) Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Optimal control and calculus of variations, existence of solutions to optimal control problems, necessary conditions of optimality, Pontryagin minimum principle, Euler equation; sufficient conditions of optimality, Hamilton-Jacobi-Bellman equation, linear quadratic regulator problems and constrained and constrained optimal control problems. (Same course as Mathematics 259.)

260. Random Signals and Noise (4) II. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 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 doubly-stationary between time averages and expected values, filters and dynamical systems. Applications.

262. Spectral Analysis (4) II. Gardner

263. Optimal and Adaptive Filtering (3) III. Friedlander, Gardner, Levy

264. Estimation and Detection of Signals in Noise (4) III. Friedlander, Gardner, Levy
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 263 and 262. 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.

266. Information Theory and Coding (3) III. Alzari, 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.

267. Digital Communications Engineering (3) I. Fehér
Lecture—3 hours. Prerequisite: course 260. Concepts and system configurations. Principles and design of data transmission systems. Digital communication receivers for digital baseband and modulation systems. Design and application of QPSK, OQPSK, GPRS and error correction codes in ISDN satellite, microwave, and cable systems.

268. Advanced Digital Modulation Techniques (3) II. Fehér
Lecture—3 hours. Prerequisite: courses 260 and 267. MODEM (modulator-demodulator) and signal-processing sub-system analysis, design and application for digital satellite, microwave, mobile radio and cable systems. Study of correlated/coded modem, computer-aided and hardware design of advanced communication and synchronization systems.

269. Error Correcting Codes (3) III. 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. Wilken
Lecture—3 hours. Prerequisite: course 170, 180A. Emphasis on quantitative analysis of design trade-offs, optimization of resource usage, formal descriptive models, and interactions between architecture and software.

271. Advanced Digital System Design (4) II. Oklobdzija
Laboratory—3 hours; laboratory—3 hours. Prerequisite: course 177. Topics in advanced design of arithmetic processors, high-speed addition, multiplication, and division. Floating point processors. Pipeline processors. Laboratory involving design and construction of several example systems.

273. Bit-Slice Microprogramming CISC and RISC Systems (3) II.
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 171, 172, 177. Microprogramming techniques for the design of control unit of CPU for CISC (Complex Instruction Set Computer); microprogram control technique and state machine concept for digital logic design; hardware emulation of microprocessor, survey of RISC (Reduced Instruction Set Computer) based systems; hardware emulation of RISC based systems. Offered in alternate years.

274. Parallel Computer Architectures (3) III. Oklobdzija, Redondo
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 multi-processors, and through novel structures such as dataflow machines. Current research.
276A. Introduction to Fault-Tolerant Computing (S) II. Wilken
Lecture—3 hours. Prerequisite: course 170, 180A. Introduces fault-tolerant computing theory and practice. Covers basic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability models and example fault-tolerant architectures. Offered in alternate years.

276B. Introduction to Digital Fault Diagnosis (3) I. Redinbo
Lecture—3 hours. Prerequisite: course 180A; Statistics 120 or 131A. A review of several current techniques for fault diagnosis that are used 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. Offered in alternate years.

277. Real-Time Multiprocessor/Multitasking System Design (5) III. Oklobdzija
Lecture—2 hours; laboratory—9 hours. Prerequisite: courses 170, 177, 180A. Computer Science Engineering 150. Real-time system design using multiple 16-bit microprocessors. System development and emulation through IBM/AT driven STD-bus system, and Intel's RMX286 assembly. Design and testing of basic real-time executive and system design with RMX286 real-time multitasking operating system. Offered in alternate years.

278. Computer Arithmetic for Digital Implementation (3) III. Oklobdzija, Redinbo
Lecture—3 hours. Prerequisite: course 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.

279. Artificial Neurons and Applications (4). I
Lecture—1.5 hours; discussion—1.5 hours, laboratory—3 hours. Prerequisites: courses 172, 180B, 207. Biological, artificial neural modelling and implementation, adaptive learning algorithms, applications to pattern recognition. Offered in alternate years.

280. Advanced Logic Design (3) III. 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 PGBAs. Design methodology and CAD tools.

289A-U. Special Topics In Electrical Engineering and Computer Science (1-3) 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-speed Frequency 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 the topic is different.

290. Seminar (1-3) I. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion and presentation of current research and development. (SU grading only.)

290C. Conference Group Conference in Electrical and Computer Engineering (1-2) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Team projects, progress, and techniques in electrical and computer engineering. May be repeated for credit. (SU grading only.)

291. Solid-State Circuit Research Laboratory Seminar (1-3) I. 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. (SU grading only.)

292. Seminar in Solid-State Technology (1-3) III. The Staff (Churchill in charge)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by various visiting experts in the field. (SU grading only.)

294. Image, Video, and Vision Research Seminar (1-3) III. Aliage Seminar—1 hour. Prerequisite: graduate standing. Lectures, tutorials, and seminars on image processing, video engineering, and computer vision. (SU grading only.)

295A. Robotics Research Seminar (1-3) I. The Staff (Hsia in charge)
Seminar—1 hour. Prerequisite: graduate standing. Technical presentation and lectures on current topics of robotics research and robotics technology. (SU grading only.)

295B. Systems and Control Seminar (1-3) III. The Staff (Gundes in charge)
Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Course

300. The Teaching of Electrical Engineering (1-3) I, II, III. The Staff
Discussion—1 hour. Prerequisite: must have taken ENGR 73 and may have been admitted to the graduate assistant or associate-in in an engineering college. Participation is a teaching assistant or associate-in in a designated engineering course. Meets twice a week. (SU grading only.)

Lower Division Courses

10. Basic Concepts of Computing (4) I, II, III. 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, the 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) III, IV. Walter
Lecture—3 hours; laboratory—2 hours. Computer programs in modern society. Emphasis on use in non-scientific disciplines. Instructs in user and expert programming. Introduces vendors to computer programs and personal programming projects, and an overview of current and projected computer uses. Introduces students to major computing languages and disciplines. General Education credit. Natural Environment.

30. Introduction to Programming and Problem Solving (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to computers and computer programming, algorithm design, running, debugging and testing of well-structured programs. Programming language Pascal will be used to solve problems. (Not open to students who have completed course 10, 35 or former course 30H. Only two units of credit allowed for students who have completed Engineering 5.)

Engineering: Computer Science 215

25. 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, 35, Engineering 5, or former course 30H. Intended for students who have been exposed to a high-level programming language in high school.

30. Introduction to Software Development (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or 35. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Application of dynamic data structures. Introduction to programming language C.

50. Computer Organization and Machine-Dependent Programming (4) I, II. Farrens, Matlof, Park
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30. Comparative study of different hardware architectures, via programming in the assembly language 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) 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 the topic is different.

92. Internship in Computer Science (1-5) I, II. The Staff (Chairperson in charge)
(No credit; no grade assigned.)

Courses in Engineering: Computer Science (ECS)

10. Basic Concepts of Computing (4) I, II, III. 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, the 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) III, IV. Walter
Lecture—3 hours; laboratory—2 hours. Computer programs in modern society. Emphasis on use in non-scientific disciplines. Instructs in user and expert programming. Introduces vendors to computer programs and personal programming projects, and an overview of current and projected computer uses. Introduces students to major computing languages and disciplines. General Education credit. Natural Environment.

30. Introduction to Programming and Problem Solving (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to computers and computer programming, algorithm design, running, debugging and testing of well-structured programs. Programming language Pascal will be used to solve problems. (Not open to students who have completed course 10, 35 or former course 30H. Only two units of credit allowed for students who have completed Engineering 5.)

Course not offered this academic year.

*Course not offered this academic year.
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 those who have taken Computer Science Engineering 122.

122B. Algorithm Design and Analysis (3) I. Gusfield, Matiel Lecture—3 hours. Prerequisite: course 122A. Theory and solution of hard problems, and problems with complex algorithmic solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Students develop and implement practical algorithms. Examples from parallel, string, graph, and geometric algorithms.

140A. Programming Languages (4) I, II. Ganapathi, Olsson, Archer Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, scoping, parameter disciplines, exception handling, Control of several high-level languages. Not open for credit to students who have taken Computer Science Engineering 140.

140B. Programming Languages (4) II. Archer, Ganapathi, Olsson, Levitt 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 languages such as current (parallel), dataflow, and constraint; key implementation issues for those paradigms; and programming languages semantics.

142. Compilers (4) III. Archer, Linz Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140A; course 160 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of a practical compiler.

150. Operating Systems and System Programming (4) II, III. Levitt, Matiloff, Olsson Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140A. Operating systems, multimedia, and microcomputer operating systems, programming and linking; file and I/O subsystems; utility programs. Study of a real operating system.

151A. Operating System Design (4) I. Ruscinita Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150 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 151A.

151B. Operating System Design (3) II. Ruscinita 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, deadlock, and synchronization. Management of physical and virtual resources. Protection mechanisms. User interface and hardware considerations. Not open to students who have taken Electrical and Computer Engineering 151B.


154A. Computer Architecture (4) I, II. Farrens, Matloff, Muhkerjee, Park Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70, and course 150A or Electrical and Computer Engineering 170. Fundamentals of computer architecture, including design of instruction sets, addressing, instruction format, instruction execution times, instruction set architecture, pipelining, instruction scheduling, performance analysis, microprocessors, and multiprocessors. Not open to students who have taken Electrical and Computer Engineering 154.

154B. Computer Architecture (4) II, III. Farrens, Matiloff, Park 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 parallelism and multiprocessing.

158. Programming on Parallel Architectures (3) III. Matiloff, Farrens, Park Lecture—3 hours. Prerequisite: course 154B or Electrical and Computer Engineering 170, and course 150 or 154A. Technology of hardware 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 Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110 and 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 100, 110. Study of the principles of user/ computer interaction. User interface management system architecture, 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) I, II. Walters 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 Lecture—3 hours; laboratory—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170. Database design and implementation of individual database applications. Not open for credit to College of Engineering students.

167. Databases in Humanities and Sciences (4) III. Walters Lecture—3 hours; laboratory—3 hours. Prerequisite: course 45 or the equivalent. Introduction to the development of database systems and their use in humanities and social sciences. Students design and implement a small database application. Course open to students from humanities and social sciences.

170. Introduction to Artificial Intelligence (4) II. Levitt, Prechac 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. Alvarado Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140A recommended. Introduction to cognitive modeling. Study of knowledge structures and processes required for the representation and manipulation of human language. Conceptual analysis based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and systems.


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 the topic changes.

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/N grading only.)

192. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: completion of a minimum of 64 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

220. Theory of Computation (3) III. Linz Lecture—3 hours. Prerequisite: courses 120 and 122A. Theory of computation: the notion of effective procedures, computability, Turing machines, Post symbol manipulation system, models similar to digital computers, computational complexity and intractable problems.

221. Formal Language Theory (3) III. Archer, Linz Lecture—3 hours. Prerequisite: course 220. Definition and properties of formal languages, deterministic context-free languages, context-sensitive languages, abstract families of languages, special topics of current interest.

222A. Design and Analysis of Algorithms (3) I. Olsson 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) I. Olsson Lecture—3 hours. Prerequisite: course 222A; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating. Search techniques. Graph algorithms.
works. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are examined in some detail.

225. Graph Theory (3) I. Halim

226. Computational Algorithms in VLSI (3) I. Kour
Lecture—3 hours. Prerequisite: course 122A, Electrical and Computer Engineering 180A. Application and inherent limitations of using VLSI to implement computational algorithms; design and analysis of algorithms for the design of VLSI circuits; VLSI test set generation and simulation.

240. Programming Languages (3) II. Archer
Lecture—3 hours. Prerequisite: courses 140A, 142. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, and an introduction to the theoretical foundations of various language design principles, alternative programming language paradigms, or in-depth semantic theory.

242. Translation of Programming Languages (3) III. Archer
Lecture—3 hours. Prerequisite: course 242. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compiler-compilers. (Not open for credit to students who have completed former courses in Electrical and Computer Engineering 278B.)

243. Code Generation and Optimization (3) I.
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. (Not open for credit to students who have completed former courses in Electrical and Computer Engineering 278C.)

244. Principles of Concurrent Programming (3) I.
Olsson
Lecture—3 hours. Prerequisite: course 100, and course 150 or 151B. Fundamental concepts and application of various programming and concurrent programming verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

245. Data Processing Languages (3) II. Keller
Lecture—3 hours. Prerequisite: course 240. Languages constructs for parallel computation in functional-programming, logic-programming, and related languages. Representation and implementation of tasks spawning and synchronization. Forms of parallelism, including explicit vs. implicit, AND vs. OR, and All-Solutions vs. Committed-Choice. Techniques of data flow, suspensions, graph reduction, backtracking, difference lists, etc. Mapping to architectures.

250A. Advanced Computer Architecture (3)
Mallot
Lecture—3 hours. 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 band width limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extension/modifications of work in the research literature.

250B. High-Performance Uniprocessing (3) II. Farentino
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. Park
Lecture—3 hours. Prerequisite: course 250A. Using parallelism to increase computational speed. Interconnection topologies, programming paradigms, architecture-specific algorithms; synchronization; parallel operating systems.

251. Operating System Models (3) III. Ruschitzka
Lecture—3 hours. Prerequisite: course 151B; introductory course; survey of research on basic models of systems that are used in the study of operating systems. Modelling of parallel processes and their synchronization in terms of practical orderings and Petri nets. Deterministic and probabilistic models for the evaluation of system performance measures.

252. Local Area Networks (3) III. Mukherjee
Lecture—3 hours. Prerequisite: course 152. Local area networks and their functions, structures, and access protocols. Emphasis on performance modeling and analysis of multiple access techniques in polling, ring, and random access networks. Also discussed are standards, example products, and recent directions in the field.

253. Cryptography and Data Security (3) I. Levitt
Lecture—3 hours. Prerequisite: course 150; consent of instructor. Methods of protecting data in computer and communication systems from unauthorized disclosure, destruction, and modification. Mathematical techniques and practical principles of security with applications to computer systems, databases, and computer networks.

258A. Analytic Methods for Computer Systems Design (3) I.
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.

258B. Modeling and Analysis of Computer Networks (3) I.
Lecture—3 hours. Prerequisite: course 256A. Use of simulation and queueing theory in the design of wide-area and local computer networks, with particular emphasis on optimization. Multiple access protocols, capacity planning, topological design, flow congestion control, routing.

260. Software Engineering (3) I. Levitt
Lecture—3 hours. Prerequisite: courses 140A, 160. Advanced techniques for programs specification, design implementation, and documentation. Application of techniques to large-scale software systems.

261. Program Verification (3) I. Archer
Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Knowledge of the propositional and a functional programing language. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for automated program verification. Logic background, symbolic execution, techniques suitable to iterative programming, methods from denotational semantics, termination, dynamic logic, and proofs of concurrent programs.

262. Formal Specification (3) II. Archer

265. Database Systems (3) III. Walters
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 computer language history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta procedures, performance evaluation and applications. Projects in programming, meta language implementation, validation and performance measures.

270. Artificial Intelligence (3) II. Alvarado

271. Machine Learning and Discovery (3) III.
Predits
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. Alvarado
Lecture—3 hours. Prerequisite: courses 172 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of computational and social systems. Focus on current models and techniques in the simulation and implementation of current methods in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

277. Automated Deduction (3) III. Archer
Lecture—3 hours. 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. Offered in alternate years.

275. Computer Graphics (3) III. Joy
Lecture—3 hours. Prerequisite: course 175. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques.

276. Advanced Raster Graphics (3) III. Joy
Lecture—3 hours. Prerequisite: course 275. Advanced topics in raster graphics technologies. Ray tracing models, advanced modeling techniques, anti-aliasing, animation. Discussion of current research in the field.

278. Computer-Aided Geometric Design (3)
III. Joy
Lecture—3 hours. Prerequisite: course 175; Applied Sciences Engineering 115 or Mathematics 128A. Mathematical techniques for interpolation, 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.

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) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

290. Seminar in Computer Science (1-5)
I, II, III. The Staff
Seminar—1 hour. Participating seminar: discussion and presentation of current research and development in computer science. (SU 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. (SU grading only.)
Engineering: Mechanical, Aeronautical, and Materials
(College of Engineering)
Allan A. McKillop, Ph.D., Chairperson of the Department
Department Office, 2132 Bainer Hall (916-752-0580)

Faculty
Ralph C. Aldredge, III, Ph.D., Assistant Professor
James W. Baugh, Ph.D., Professor (Aeronautical Science and Engineering)
Harry Brandt, Ph.D., Professor
John W. Brewer, Ph.D., Professor
Vincent R. Capace, Ph.D., Assistant Professor
Jean-Jacques Chabot, Ph.D., Professor
Harry H. Cheng, Ph.D., Assistant Professor
Andrew A. Frank, Ph.D., Professor
Jeffrey J. Gibeling, Ph.D., Associate Professor (Materials Science and Engineering)
Joanna R. Groza, Ph.D., Associate Professor (Materials Science and Engineering)
Mohamed M. Hafez, Ph.D., Professor (Aeronautical Science and Engineering)
Jerald M. Henderson, D.Eng., Professor (Food Science and Technology)
Ronald A. Hess, Ph.D., Professor (Aeronautical Science and Engineering)
Myron A. Hoffman, Ph.D., Professor
David G. Howitt, Ph.D., Professor (Materials Science and Engineering)
Mont Hubbard, Ph.D., Professor (Aeronautical Science and Engineering)
Maury Juhl, Ph.D., Professor (Automation)
Dean C. Kamopp, Ph.D., Professor
Ian M. Kennedy, Ph.D., Associate Professor
Wolfgang Kollmann, Dr.-Ing., Professor (Aeronautical Science and Engineering)
Donald L. Mullins, Ph.D., Professor
Allan A. McKillop, Ph.D., Professor
Amiya K. Mukherjee, Ph.D., Professor (Materials Science and Engineering)
Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
Zuhair A. Munir, Ph.D., Professor (Materials Science and Engineering)
Howard L. Needleman, Ph.D., Professor (Textiles and Clothing)

Courses in Engineering: Mechanical (EME)
(Courses in Mechanical Engineering are listed below; courses in Aeronautical Science and Engineering and Materials Science and Engineering 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. (S/U grading only.)

50. Manufacturing Processes (3, I, II, III)
   Henderson
   Discussion—2 hours; laboratory—3 hours. Restricted to Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to and experience with modern manufacturing methods and computer-aided manufacturing and their role in 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 (3) I, II. Hubbard
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171 and Engineering 102. Introduction to static and dynamic stability characteristics of ground transportation vehicles. Examples drawn from automobiles, trains, articulated vehicles, motorcycles, bicycles and others. Lateral handling characteristics, oversteer, understeer. Laboratory experiments illustrate effects of vehicle parameters on dynamic vehicle response.

150A. Mechanical Design (3) I, II. Hull, Velinsky
   Lecture—2 hours; discussion—1 hour. Prerequisite: course 104B, course 50 (may be taken concurrently). Restricted to Mechanical, Aeronautical, and Materials Science Engineering majors, and to Biological Systems and Food Engineering majors. The principles of engineering mechanics applied to fundamentals of mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware.

150B. Mechanical Design (3) I, II. Frank, Velinsky
   Lecture—2 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering and Materials Science Engineering majors. Principles of engineering mechanics, failure theories and fatigue theory applied to 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 (3) I. Hull
   Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress analysis, strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Mechanism Design (3) I. Cheng
   Lecture—3 hours. Prerequisite: Engineering 36. Application of complex-number method to kinematic, static, and dynamic analyses of plane mechanism and dynamic balancing of mechanisms. Design of epicyclic gear trains and intermittent mechanisms. Introduction to kinematic synthesis of mechanisms for function generation, curve tracing, and body guidance.

153. Introduction to Machining of Material (3) I. I. Yamazaki
   Lecture—3 hours. Prerequisite: Engineering 36, 45, 1048, 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 demonstration of the technology.

161. Combustion and the Environment (4) III. Kennedy
   Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 101A and 101B. Introduction to combustion kinetics; the theory of premixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion
engine, gas turbines, furnaces and waste incinerators; alternative fuel-sources.

162. Modern Power Systems (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105 or equivalent. Study of modern power plants for electric power generation and cogeneration. Thermodynamic analysis of different power plant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific power plants.

165. Fundamentals of Heat Transfer (4) I, II. Dwyer, McKillop Laboratory—3 hours; lecture—lab—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.


172. Automatic Control of Engineering Systems (4) I, II. Brewer, Snell Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain techniques; state space techniques.

176. Measurement Systems (3) III, II. Velinsky, Snell Lecture—2 hours; discussion—1 hour, laboratory—3 hours. Prerequisite: course 184A and 106 and 105B. Theory of measurements; measurement techniques for systems; transducers; data manipulation and processing; data digitization.

184A. Mechanical Engineering Design Project (2) I, III, III. The Staff Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering; consent of instructor (enrollment preference to students who have not taken any of course series 184-A, 184-B). Performance of a major design project which includes design and possible development and evaluation of a mechanical engineering system.

184B. Mechanical Engineering Design Project (2) I, III, III. The Staff Laboratory—6 hours. Prerequisite: course 184A in a previous quarter from the same instructor; consent of instructor. Performance of projects which include design and development of a component and evaluation of a mechanical engineering system.

185. Mechanical Systems Design Projects (4) III. Henderson Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series 184-A, 184-B). Design of mechanical systems. Engineering case studies will help to illustrate the engineering design process and its use in design of engineering systems. Grading based on individual contributions to projects.

186. Thermal Systems Design Project (4) III. Aldridge 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-A, 184-B). 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 projects.

167. Control Systems Design Project (4) III. Frank Lecture—3 hours; discussion—1 hour. Prerequisite: course 157; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series 184-A, 184-B). 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.

186. Vehicle Systems Design Project (4) II. Frank Lecture—2 hours; laboratory—6 hours. Prerequisite: course 155B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series 184-A, 184-B). Design of a vehicle system, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related complex problem or individual contributions to projects. Limited enrollment.

192. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: upper division standing; approval of project prior to 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) Directed study. 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. Brandt Lecture—3 hours. Prerequisite: course 165 or consent of instructor. Description of geometric, spectral and spatial characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems. Offered in alternate years.

208A. Experimental Methods in the Thermal Sciences (2-1) Laboratory—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Design and operation of experimental instruments and techniques for measuring temperature, pressure, and concentration of gases. Offered in alternate years.


210A. Advanced Fluid Mechanics and Heat Transfer (4) II. Kolmann 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 equations. (P/NP grading only.)

210B. Advanced Fluid Mechanics and Heat Transfer (4) II. Kolmann 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 equations. (P/NP grading only.)

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.

212. Advanced Heat Transfer with Phase Change (4) III. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relations; application to various energy system and power plant problems. Offered in alternate years.

213. Advanced Turbine Modeling (4) III. Kollmann Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbomachinery, kinematics and dynamics of heterogeneous turbines. Reynolds-averaged and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydrodynamic 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.

216. Advanced Thermodynamics (4) I. Shaw Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 136B. Study of topics important to energy conversion systems, propulsion and other systems using temperature. Thermodynamics. Statistical thermodynamics and quantum statistical mechanics of nonreac- ting and chemically reacting gases, gas mixtures, and other substances. Offered in alternate years.

217. Combustion (4) I. Aldridge Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Review of chemical ther- modynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena; detonations, laminar flame structure and turbulent combustion.

218. Advanced Energy Systems (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 136B, 105B, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power cycles, component efficiencies, and overall plant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric power plant. Offered in alternate years.

220A-220B. Mechanical Vibrations (3-3) III-III. Mar- golis 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. Margolis Lecture—3 hours. Prerequisite: Engineering 102. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principle; Lagrange's Equations; Hamilton-Jacobi theory.

223A. Multibody Dynamics (4) II. Hubbard Lecture—3 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructor. Dynamics of coupled rigid bodies: multibody kinematics; Euler and Tate-Bryan angles; constrained motion; nonholonomic systems; inertia, dyadics, generalized active and inertia forces; Kane, Newton-Euler, and Lagrange formulations for multibody systems; computer-aided equation of motion development.

228. Multibody Dynamics II (4) III. Hubbard Lecture—3 hours; discussion—1 hour. Prerequisite: course 223A. Advanced topics on the dynamics of coupled rigid bodies; multibody kinematics; multibody kinetcs; extraction of information from dynamical systems, linearization/stability of motion, numerical methods in dynamics; computer simulations.

224. Kinematic Design of Mechanisms (3) III. Ravani Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Bernstein theory of the
rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path structure analysis, circle- and center-point curves. Graph and computer methods for kinematic design. Offered in alternate years.

225. Spatial Kinematics and Robotics (3) II. The Staff 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: singularities for kinematic equations; differentiating relationships; motion trajectories; Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years.

226. Acoustics and Noise Control (3) I. Hubbard Approximate—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.

234. Design and Dynamics of Road Vehicles (3) II. Velinsky Lecture—3 hours. Prerequisite: course 124. Analysis and numerical simulation of road vehicles with emphasis on design applications. Offered in alternate years.

251. Mechatronics (4) III. Yamazaki Lecture—2 hours, laboratory—3 hours. Prerequisite: course 127. Studies of techniques required for designing the electromechanical system which consists of the mechanism and the electronics-based sophisticated control. Methodologies for designing the microprocessor applied control hardware and dedicated software, applying electric and dedicated software, and applying electric actuator and sensors with its theoretical background.

260. Computer-Aided Design and Manufacturing (3) II. Yamazaki 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-computational geometries in design and manufacturing.

270. Modeling and Simulation of Engineering Systems (3) III. Karronn Lecture—3 hours. Prerequisite: course 127 or consent of instructor. Multiport models of mechanical, electrical, hydraulic, and thermal devices: bond graphs, block diagrams and state space equations; Hamilton's principles; computer models; formulation for analog and digital simulation; identification; instrumentation; application. Analysis of models of distributed systems.

271. Design of Multivariable Control Systems (3) II. Karronn Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback design by state and feedback approaches. Introduction to observers and equivalent dynamic feedback. Stress on practical application of theory to engineering systems in various energy domains.


272B. Multivariable Feedback Control and Estimation Theory (4) II. Brewer Lecture—4 hours. Prerequisite: course 272A. Emphasis on multi-input, multi-output systems. Digital and continuous time control and estimation. Introduction to state space and composite feedback and comprehensive feedback theory. Optimum Wiener-Hopf design and other frequency domain methods.
135. **Aerospace Structures** (4) I. Reffild
   Lecture—3 hours. Prerequisite: course 133. Analysis and design methods used in aircraft structures. Shear flow, torsion, and multi-cell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.

137. **Structural Composites** (4) I. Reffild
   Lecture—3 hours. Laboratory—1 hour. Prerequisite: Engineering 103B. Laboratory. Composites and technology for creating structures from fiber reinforced resin matrix composite materials. Elementary design analysis and case studies emphasizing aeronautical applications.

138A. **Aircraft Propulsion** (4) II. Capece
   Lecture—3 hours. Discussion—1 hour. Prerequisite: Engineering 45, 103B, 104B. 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 Aerelasticity** (4) III. Sarigul-Klijn

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**

230. **Advanced Aerodynamics—Inviscid Flow** (4) II. Hale
   Lecture—4 hours. Prerequisite: courses 126, 127, 128. Inviscid theory. Nonlinear effects in subsonic and supersonic flows. Transonic aerodynamics. Offered in alternate years.

232. **Advanced Aerodynamics—Viscous Flow** (4) I. Dewy
   Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers. Instability and transition, separation, viscous-inviscid interaction, three-dimensional flows and computational methods and their application. Offered in alternate years.

233. **Introduction to Computational Aerodynamics and Fluid Dynamics** (4) I. Chatoat
   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.

234. **Computational Aerodynamics** (4) I. Dewy

235. **Computational Fluid Dynamics, Euler and Navier-Stokes Equations** (4) II. Chatoat
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 233 or consent of instructor. Euler and Navier-Stokes equations, conservation forms, numerical methods for systems of convection and convection-diffusion equations, computation of compressible Euler and Navier-Stokes equations, generalized coordinates, grid generation, applications.

236. **Aerodynamics in Nature and Technology** (4) III. White
   Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, wind effects on man-made objects, pedestrian-level winds in urban areas. Cryptic applications to transcritical flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in alternate years.

237. **Analysis and Design of Composite Structures** (4) III. Reffild
   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 fatigue life processes.

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.

239. **Advanced Theory and Analysis for Flight Structures** (4) II. Sarigul-Klijn
   Lecture—4 hours. Prerequisite: course 135 and Engineering 122. Environment for flight vehicle structures. An introduction to classical and modern techniques of design and analysis of aircraft structures. Response of structures. Temperature and mechanical effects in flight structures. Applications of virtual principles to structural analysis with an emphasis on air-craft and space structures. Offered in alternate years.

240. **Computational Methods in Nonlinear Mechanics** (4) II. Sarigul-Klijn
   Lecture—4 hours. Prerequisite: Applied Science Engineering 115; Mathematics 126B. Deformation of solids and the motion of fluids are treated within the framework of the state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; vector computers with special applications to nonlinear mechanics. Offered in alternate years.

261. **Gas Dynamics** (4) III. Capece
   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 and unsteady boundary layer flow. Offered in alternate years.

275. **Advanced Topics in Aircraft Stability and Control** (4) I. Hess
   Lecture—3 hours. Discussion—1 hour. Prerequisite: Mechanical Engineering 172. Development of aircraft equations of motion; response to control actuation; response to random inputs—turbulence description; stability augmentation system design; autopilot analysis; handling qualities. Offered in alternate years.

299C. **Graduate Research Conference** (1-3) 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. (SU grading only.)

298. **Group Study** (1-3) I, II, III. The Staff (Chairperson in charge)

299. **Research** (1-12) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (SA grading only).

**Professional Courses**

300. **The Teaching of Aeronautical Science and Engineering** (1) I, II, III. The Staff
   Discussion—1 hour. Prerequisite: me 100B and associate-in-aeronautical science and engineering. Methods of teaching leading discussion groups of laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only.)

**Courses in Materials Science and Engineering (EMS)**

**Upper Division Courses**

310. **Thermodynamics of Materials Processes** (3) I. Rasboud
   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, semiconductor, thermoelectric power, and thermonic energy conversion.

312. **Structure of Engineering Materials** (3) I. Howitt
   Lecture—3 hours. Prerequisite: Engineering 45; 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, semiconductor, thermoelectric power, and thermonic energy conversion.

313. **Structure of Materials Laboratory** (1-I) I. Howitt
   Laboratory—3 hours. Prerequisite: course 132 concurrently. Experimental investigations of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

314. **Rate Processes in Materials Science** (3) III. Grosa
   Lecture—3 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporation, and sintering processes.

343. **Rate Processes in Materials Laboratory** (1-I) III. Grosa
   Laboratory—3 hours. Prerequisite: course 134 concurrently. Laboratory experiments to illustrate fundamental principles of diffusion, sintering, and phase transformations in materials.

346. **Mechanical Behavior of Materials** (3) II. 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 research in the field. Introduction to the microscopic science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined.

356. **Mechanical Properties Laboratory** (1-I) III. Mukherjee
   Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigations of mechanical behavior of materials. Laboratory exercises emphasize fundamental relationships between microstructure and mechanical properties.

360. **Materials in Engineering Design** (3) III. Sibinga
   Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Qualitative 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.

400. **Materials Selection Laboratory** (1-I) III. Gaugh
   Laboratory—3 hours. Prerequisite: course 140 concurrently. Experimental investigations of processing and properties of materials used in structural applications. Laboratory exercises emphasize fundamental relationships between microstructure and grading
142. Nondestructive Testing Laboratory (3) I. Shackelford
Lecture—3 hours. Prerequisite: course 142 concurrently. Laboratory experience in non-destructive testing techniques with emphasis on X-ray radiography, X-ray diffraction, and ultrasonics.

144. Corrosion and Oxidation of Engineering Materials (3) I. 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 environments: design and selection criteria for the prevention of corrosion.

145. Electronic and Optical Materials Processing (3) I. Riehle
Lecture—3 hours. Prerequisite: upper division standing in Engineering, Principles of phase equilibria, thermodynamics and reaction kinetics. Preparation of electronic and optical materials in polycrystalline, single crystal, and amorphous forms.

147. Principles of Polymer Materials Science (3) II. Munir
Lecture—3 hours. Prerequisite: chemistry through Organic 45; introductory physics sequence. Basic principles of polymer science: including polymer structure and synthesis, polymerization reactions, polymer characterization, and applications of polymer processing. (Same course as Fibers and Polymer Science 100.)

148. Failure Analysis (4) II. The Staff
Lecture—4 hours. Prerequisite: Engineering 45; course 138 and Mechanical Engineering 150A recommended. Fracture mechanics and failure mechanisms in materials, ceramics, and composites. Effects of fatigue, corrosion and wear. Methodology for investigating failure including optical microscopy, scanning electron microscopy, and destructive testing.

149. Materials Engineering Design Project (3) I, II. The Staff
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 140 may be taken concurrently. A student engineering design experience involving analysis of real materials problems or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

150. Manufacturing Process Design (3) I. Groza
Lecture—4 hours. Prerequisite: Engineering 45; Mechanical Engineering 150A may be taken concurrently. Principles of materials processing and manufacturing properties, effects of processing variables, structure-property relationships, and the fundamentals of manufacturing process selection for engineering.

150C. Research Group Conference (1) I, II, III.
The Staff (McClintock in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Upper division standing. Individual and/or group conference on progress, problems, and techniques in materials research. May be repeated for credit. (P/NP grading only.)

158. 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. Advanced 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 electron microscopy. Study of electron microscope analysis in the advanced study of advanced materials. Emphasis upon practical applications. Offered in alternate years.

230L. Laboratory for Electron Microscopy (2) II. Howitt
Lecture—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron microscopy and scanning 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 232. Advanced topics in the techniques of electron microscopy including analytical techniques, high-resolution imaging, and electron diffraction. Offered in alternate years.

232L. Laboratory for Advanced Transmission Electron Microscopy (2) II. Howitt
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232. Advanced 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) II. M. Silver
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 transfer, chemical and physical vapor deposition, crystal growth, handling, sintering and joining of metals. Offered in alternate years.

241. Principles and Applications of Dislocation Mechanics (4) II. Groza
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering; consent of instructor. Concepts in dislocation theory are applied to explain the deformation of crystalline solids. Glide and climb of dislocations, strain hardening, recovery, dynamic and recovery phenomena are discussed. Offered in alternate years.

242. Advanced Mechanical Properties of Engineering 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 shear, superplasticity, and cavitation. Influence of microstructure in engineering growth. Honorary and heterogeneous transformation. Transformation by shear, order-disorder reactions. Offered in alternate years.

244. Interaction of Materials and their Environment (3) I, III
Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and galvanic 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. Nature of microstructure in engineering materials will be explored. Crystaline 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. Riehle
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 defect generation, influence of surfaces on processes; thermodynamics of EMF cells and application to solid-state electronics. Offered in alternate years.

248. Fracture of Engineering Materials (3) I. Gibling
Lecture—3 hours. Prerequisite: course 134. Description of failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in alternate years.

249. Mechanics of Fatigue (3) I. Gibling
Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 246 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. Zeranov
Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each year the course is offered. (Same course as Textiles and Clothing 250A-F.)

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, Gibling, Groza, Riehle
Seminar—1 hour. Prerequisite: graduate standing in good standing. Review and discussion of current literature and developments in materials science with presentations by individual students. (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.)
English Course
(College of Letters and Science)
Peter A. Dale, Ph.D., Chairperson of the Department
Department Office, 114 Sprout Hall, (916) 752-2257

Faculty
William E. Baker, Ph.D., Professor
Phillip J. Barron, Ph.D., Assistant Professor
Max Byrd, Ph.D., Professor
Carol A. Cord, Ph.D., Associate Professor
Peter A. Dale, Ph.D., Professor
Sandra M. Gilbert, Ph.D., Professor
John O. Hayden, Ph.D., Professor
Peter L. Hayes, Ph.D., Professor
W. Jack Hicks, Ph.D., Associate Professor
Michael J. Huffman, Ph.D., Professor
Michael F. Kramer, Ph.D., Associate Professor
Richard A. Levin, Ph.D., Associate Professor
Academic Senate Distinguished Teaching Award
Karl E. Liske, Ph.D., Associate Professor
Clarence Major, Ph.D., Professor
Arthur E. McGuinness, Ph.D., Professor
Sandra J. McPherson, B.A., Professor
Patricia L. Moran, Ph.D., Assistant Professor
Linda A. Morris, Ph.D., Senior Lecturer
Marjorie Osborn, Ph.D., Associate Professor
David A. Robertson, Ph.D., Professor
Emeriti Faculty
Everett Carter, Ph.D., Professor Emeritus
Thomas A. Harno, Ph.D., Professor Emeritus
Wayne Parish, Ph.D., Professor Emeritus
Robert H. Hopkins, Ph.D., Professor Emeritus
James J. Murphy, Ph.D., Professor Emeritus
Gwendolyn Schiwa, M.A., Senior Lecturer Emeritus
Karl J. Shapiro, Professor Emeritus
Daniel Stovel, Ph.D., Professor Emeritus
Brom Weber, Ph.D., Professor of American Literature Emeritus
James L. Woodress, Ph.D., Professor Emeritus
Curtis T. Wright, Ph.D., Professor Emeritus

The Major Program
The English major develops skills in reading analytically and perceptive 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 language. The writing emphasis focuses on fiction, poetry, and article writing.

and magazine editing. Creative writing majors have an opportunity to work with distinguished professional writers of fiction and poetry, and to be involved with a national literary magazine, California Quarterly, published by the English department. The general literature emphasis focuses on a series of related courses in various historical periods of English and American literature. A Senior Honors Program is available to an insured group of English majors, whom prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. Graduate courses lead to the M.A. and Ph.D. degrees.

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 even established their own businesses.

A.B. Degree Requirements:

Preparatory Subject Matter: 24

 english 45, 30A, 30B, 46A, 46B, 46C, 46D, 46F

Depth Subject Matter (see below): 18

A. Historical Periods: 16

One course each in four of the following five major areas:
1) British literature, beginning to 1500: English 111, 150A
2) British literature, 1500-1660: English 116, 120, 150B
3) British literature, 1660-1800 or American literature, 1625-1800: English 125, 127, 140, 141, 151A
4) Nineteenth-century British or American literature: English 130, 132, 133, 134, 143, 144, 150B, 153C, 158A, 158B
5) Twentieth-century British or American literature: English 136, 137, 138, 139, 146, 147, 150C, 152D, 152E, 155B, 165, 179, 181, 185B

B. Major Authors: 8

Two courses at 100-104 level selected from English 113A, 133B, 137A, 137B, 147C, 149. Courses used to meet this requirement may not duplicate courses chosen to meet the historical periods requirement.

C. Senior Seminar: 4

One course selected from English 187, 188, 189, 194H

General Major:

Depth Subject Matter: 44

Core requirements (see above): 28

One course from language/linguistics: English 105A, 105B, 46F

Twelve elective units in upper division English courses: 12

Total Units for the Major: 68

Teaching Emphasis:

Depth Subject Matter: 44

Core requirements, same as for General major above, but must include one course from English 117A, 117B, or 117C: 28

English 103F, 105A, 105B: 12

One course selected from English 179, 181, or an ethnic studies course outside the English department: 12

Total Units (Teaching Emphasis): 68

Writing Emphasis:

Depth Subject Matter: 44

Core requirement, same as for General major above: 28

One course from language and linguistics: English 105A, 105B: 4

Twelve units in English 100F, 100G, and/or 100H: 4

Total Units (Writing Emphasis): 68

English Majors

Up to four upper division units in a national literature other than English or American, in Comparative Literature, may count toward the requirements of the major.

Minor Program Requirements:

UNITS

English: 19-20

Five upper division courses, four of which will be literature courses: 19-20

C. Campus Writing Center. The Campus Writing Center, an affiliate of the English Department, is a program designed to provide writing instruction across the curricula. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in courses in other disciplines. Topics of instruction include reading, writing, and oral presentations. Credit for each course is given for English 1 or 2, or for the current schedule of courses.

Subject A. Students must have passed the Subject A requirement before taking any course in English. Prerequisites. English 1 or 3 is required for admission into courses 30A, 30B, 45A, 46B, 46C, and all upper division courses. Course 45 is recommended as preparation for the 200 and 400 level courses.

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 must see their advisers, individually, in the spring quarters of their sophomore and junior years.

Undergraduate Adviser: K.F. Zender.


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.

Hons and Honors Program. The honors program consists of a minimum of 4 units and four of 194H. Normally taken during the fall and winter quarters of the senior year. Completion of the program is required for high honors at graduation. All requirements must be completed by the spring quarter of the senior year. All requirements must be completed by the spring quarter of the senior year.

Teaching Credential Subject Representative, R.A. Levin. See also Undergraduate 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 Cretal Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theory and methodology in the Humanities and Social Sciences).

Graduate Adviser, Contact department.
Courses in English (ENL)

Lower Division Courses

A. Language Skills (22), II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Introductory course to help students gain writing proficiency required for successful upper-division 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 passed with a C or better. Maximum passing grade is a C; students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum study list requirement. (P/NP grading only.)

1. Expository Writing (4) I, II, III. 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 A. Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

2. Introduction to Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 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 available in English prose and poetry. Frequent writing assignments will be made. Satisfies communication requirement. (P/NP grading only.)

3. Introduction to Modern Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours. Discussion—2 hours. Prerequisite: completion of Subject A requirement. Introduction to modern literature with emphasis on the development of English literature from the 15th to the 20th century. Some consideration of the impact of modern literature on contemporary society. Frequent writing assignments will be made. (P/NP grading only.)

4. Critical Inquiry and Literature: Freshman Seminar (4) I. The Staff (Chairperson in charge)
Seminar—4 hours. Lecture—2 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 discussion and writing. Students will complete a term paper or a longer seminar paper in the major. Reading assignments will be made. General Education credit: Civilization and Culture

5. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours. Discussion—2 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. Frequent writing assignments will be made. (P/NP grading only.)

6. 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. Frequent writing assignments will be made. (P/NP grading only.)

7. Intermediate Composition (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 1 or 2 or completion of Writing 1. Emphasis on the grammatical patterns of standard written English. Sentence revision techniques, development of coherent paragraphs, and formal proctoring of the expository essay.

30A. Survey of American Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1960s. Frequent writing assignments will be made. (P/NP grading only.)

30B. Survey of American Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1960s to the present. Frequent writing exercises.

46A. Masterpieces of English Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers to 1840. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. (P/NP grading only.)

46B. Masterpieces of English Literature (4) I, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1840 to 1923. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. (P/NP grading only.)

46C. Masterpieces of English Literature (4) I, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1923 to 1930. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. (P/NP grading only.)

92. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—1 hour. 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)
Prerequisite: course 1 or 3. (P/NP grading only.)

Upper Division Courses

100. Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5 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.

100N. Creative Writing: Non-Fiction (4) I, II, III. The Staff (Chairperson in charge)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5 or 5P, 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, II, III. The Staff (Chairperson in charge)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5 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. Final examination.

102. Adjunct Writing (3) I, II, III. The Staff (Chairperson in charge)
Discussion—3 hours. Prerequisite: course 1 or 3. Concurrent enrollment in a specified course in a subject-matter discipline. 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.

103A-F. Advanced Composition (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; individual evaluations and conferences. Prerequisite: course 1 or 3. Course 20 recommended as preparation. May be repeated once for credit in a different area of emphasis.

104. Scientific Writing (3) I, II, III. The Staff (Chairperson in charge)
Lecture—2 hours; conference—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing, research methodologies, organization, proper style and format, oral presentation of scientific papers. Lecture and workshop-discussions by English and science department staff. (P/NP grading only.)

105A. Language (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Required of teaching credential candidates.

110A. Introduction to Principles of Criticism (4) I, II, III. The Staff (Chairperson in charge)
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.

110B. Introduction to Principles of Criticism (4) I, II, III. The Staff (Chairperson in charge)
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.

111. Medieval Literature (4) I, II. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major types, traditions, and conventions of literature of medieval England from the time of Beowulf to the late medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

113A. Chaucer: Troilus and the "Minor" Poems (4) I, II, III. The Staff (Chairperson in charge)
Lecture—2 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.

113B. The Canterbury Tales Complete as a work of art. Courtly love, literary forms, medieval science and astrology, theology and dogs as they inform the reading of Chaucer. Courses 113A and 113B need not be taken in sequence.

116. Sixteenth-Century Poetry and Prose (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the poetry and prose of the sixteenth century. Readings in the works of Spenser, Marlowe, Shakespeare, selected discursive prose and fiction, Political, religious, and irreligious background.

117A. Shakespeare: The Early Works (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the early works of Shakespeare. May be repeated once for credit if taken in conjunction with a different subject-matter course.

117B. Shakespeare: The Middle Period (4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the middle works of Shakespeare. May be repeated once for credit in a different area of emphasis.

"Course not offered this academic year."
117C. Shakespeare: The Later Works (4) II.
Zender, III. Schiener
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.

*118. Shakespeare (4)
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. General Education Credit: Civilization and Culture.

120. Earlier Seventeenth-Century Poetry and Prose (4) II. Waddington
Lecture/discussion—3 hours; term paper or the equivalent. Prerequisite: course 1 or 3. Major authors, forms, and styles. Donne, Jonson, Marvell, Bacon, Browne, Hobbes. Tradition and revolution.

122. Milton (4) III. Levin
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works, including Paradise Lost.

*125. The Age of Swift and Pope: Prose and Poetry (4)
Lecture/discussion—3 hours; term paper or the equivalent. Prerequisite: course 1 or 3. The Augustan Age: reason and imagination. Readings in Swift, Addison, Steele, Defoe, Pope, Gay, Thomson, and others.

127. Prose and Poetry of the Later Eighteenth Century (4) I. Byrd
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Readings in Johnson, Goldsmith, Boswell, and others; the poetry of the era concluding with Blake. General Education credit: Civilisation and Culture.

130. Early Romantic Literature (4) III. Hayden
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of imagination.

132. Later Romantic Literature (4) II. Lokee
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Byron, Shelley, Keats. Individualism and society.

133. Early Victorian Literature (4) III. Dale
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Tennyson, Browning, Arnold, and selected prose writers. The Victorian temper; the individual and society; the search for falsi. The impact of scientific thought upon creative thinkers.

*134. Later Victorian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Ruskin, Hardy, Hopkins, and others. The Oxford movement, the Pre-Raphaelites; art and society: aestheticism and decadence; post-impressionism. A tendency continuing into the Edwardian period.

136. British Literature from 1886 to 1918 (4) I. Williams
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Yeats, Conrad, Joyce, Aesthetics, naturalism, symbolism, and impressionism. Transition from Victorian to twentieth-century styles and attitudes.

137. British Literature from 1918 to 1940 (4) II. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Lawrie, Eliot, Forster, and others. Post-war attitudes: Modern psychology and the awareness of myth.

138. British Literature from 1940 to the Present (4) I. McGuinness
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story.

*139. Modern Anglo-Irish Writers (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. A study of Yeats, Joyce, George Moore, John Synge, James Stephens and others.

140. Origins of American Literature (4) II. Kramer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Seventeenth-century American literature; special attention to European literary-intellectual traditions, dominant American forms (poems, sermon, history, and major writers (Anne Bradstreet, Edward Taylor, and others).

*141. The American Enlightenment and Its Reaction (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English eighteenth-century American literature; rise of neoclassicism, liberal religion, popular literature, scientific thought, satiric temper; decline of Puritan traditions; major writers, including Franklin, Edwards, Freneau, and Brackenridge.

143. Aspects of American Romanticism (4) II. Van Leer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Powering of American romanticism; the metaphorical tradition, Oriental and European antecedents, philosophical idealism, and literary achievement of Transcendentalism (Emerson, Thoreau, Whitman); the critical temperers of Hawthorne and Melville; Emily Dickinson.

144. American Literature from 1865 to 1914 (4) II. Barish
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Religion, local color, social criticism, naturalism; de ahle aesthetics; Twain, James, Crane, Dreiser, Whittier.

146. Modern American Literature: 1914-1940 (4) I. Zender
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. The Modernist movement, disillusionment, artistic experimentation, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents; Pound, Fitzgerald, Eliot, Frost, Hemingway, Crane, Faulkner, and Stevens.

147. Modern American Literature: 1940 to the Present (4) II. Hicks
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Contemporary action, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.

*150A. English Drama to Marlowe (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Development of the drama from its beginnings to Marlowe's Tamburlaine. Theatricality of the genre; the nature of the playwright's conscience; the plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

150B. English Drama from Marlowe to 1642 (4) III. Levy
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearian development of dramatic action and blank verse.

150D. British Drama from 1890 to the Present (4) III. McGuinness
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on O'Neill, Williams, Miller, and others.

*152. American Drama from Its Beginnings to the Present (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on O'Neill, Williams, Miller, and others.

155A. The English Novel: 1700-1770 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett.

155B. The English Novel: 1770-1800 (4) II. Barish
Lecture—3 hours; extensive writing (includes 5 two-page position papers). Prerequisite: course 1 or 3. Evolution of the novel from 1770-1850 with particular emphasis on the invention of the Gothic novel (Radcliffe, Mary Shelley), invention of the historical novel (Sir Walter Scott), and contribution of women writers to fiction (Jane Austen, Emily, Charlotte, and Anne Bronte).

155C. The English Novel: 1850-1900 (4) I. Baker
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.

155D. The English Novel: 1900 to the Present (4) II. Moran
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the modernist revolution.

156. The Short Story (4) III. Tallent
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. General Education credit: Civilization and Culture.

158A. The American Novel to 1900 (4) II. Stange
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Rise and development of the American novel from its beginnings. Hawthorne, Melville, Twain, and others.

158B. The American Novel from 1900 to the Present (4) I. Hays
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major American novelists of the twentieth century. Faulkner, Hemingway, Fitzgerald, and others.

*160. Film as Narrative (4)
Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a narrative medium.

162. Film Theory and Criticism (4)
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. Offered in alternate years. General Education credit: Civilization and Culture.

*171A. The Bible as Literature: The Old 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. General Education credit: Civilization and Culture.

*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.

175. American Literary Humor (4) II. Morris
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: collegiate humor; southwestern and New England humor; professional and post-Civil War masters; local colorists; journalistic gags; anti-provincialists; modest poets and prose writers; black humor.

*177. Study of an Individual Author (4) I. Ricks
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.

*Course not offered this academic year.
178. Special Topics in Ethnic Literature (4) I. Kramer
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3, or sophomore standing or above. Extended study of a topic drawn from the multi-ethnic literature of the United States. Course may focus on particular ethnic groups, historical periods, writers, genres, and/or themes. May be repeated for credit when subject matter differs.

*179. Multi-Ethnic Literature (4)
Lecture/discussion—3 hours; papers. Prerequisite: course 1 or 3. Study of the literature of black Americans, including Chomsky, and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

*180. Children's Literature (4)
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.

*181. Black American Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literature of black Americans, including Chomsky, and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

*182. Literature of California (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literature of California in the context of Californian social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on the nineteenth- and twentieth-century naturalists, turn of the century novelists, and the Beats, and writers of the last two decades. Offered in alternate years. General Education credit: Civilization and Culture.

184A. Literature of the Wilderness (4)
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. General Education credit: Civilization and Culture.

185A. Literature by Women (4) I. Stange
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Chomsky, and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

185B. Literature by Women II (4) II. Gilbert
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Course 185A recommended. English language literature by women from Chomsky, and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

*187. Literature and the Other Arts (4)
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.

188. Special Topics in Literary Studies (4) I, II, 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.

189. Seminar in a Major Writer (4) I, 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.

192. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3 to 6 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A grade of A or B is allowed toward the major in English. May be repeated for credit for a total of 12 units. (PINP grading only.)

194H. Special Study for Honors Students (4) I. The Staff (Chairperson in charge)
Seminar—3 hours; papers. 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 English. Credit may be repeated for credit.

195H. Honors Thesis (4) II. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: course 194H. Preparation of a thesis, under the supervision of an instructor. Students must fulfill requirements for the 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 to 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 5 units. (PINP grading only.)

197C. Community Tutoring in English (1-4) I, II, III.
The Staff (Chairperson in charge)
Tutoring—1 to 4 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. (PINP 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. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: one course from courses 1, 3, 5F, 5P. (PINP grading only.)

Graduate Courses

200. Techniques of Literary Scholarship (4) II. Schleier
Discussion—3 hours; term paper. The elements of bibliography and its relationship 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. Introduction to Old English (4)
Discussion—3 hours; written reports; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

206. Beowulf (4)
Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Offered in alternate years.

207. Middle English (4) I. Cioffi
Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500. An introduction to the English language; 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. Hays
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 specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

215. Arthurian Romance (4) II. Ostborn
Seminar—3 hours; conference—1 hour. The sources of Arthurian Romance literature. Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

*225. Topics in Irish Literature (4)
Seminar—3 hours; conference—1 hour. Prerequisite: course 125. Course will vary from quarter to quarter and will include such topics as the seventeenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

230. Study of a Major Writer (4) II. Morris
Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

232. Problems in English Literature (4)
Seminar—3 hours; conferences with individual students—1 hour. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit when different periods or topics are studied.

233. Problems in American Literature (4) I, II, III. Kramer, Zender
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)
Seminar—3 hours; conference—1 hour. Historical introduction to dramatic literature; the genres of tragedy, comedy, and tragedy. May be repeated for credit when different topic or period is studied.

235. Theory of Fiction (4) I. 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) II. Major
Seminar—3 hours; conference—1 hour. Structure, prosody, and idiom of British and American poetry. Theories of poetry as they relate to the professional writer's practice of the craft. Designed for students in the creative writing program.

238. Special Topics in Literary Theory (4) I. Van Leer; II. Gilbert
Seminar—3 hours; term paper. Prerequisite: course 207 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) III. 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)
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) I. Levin
Seminar—3 hours; conference—1 hour. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers.
papers. May be repeated for credit when a different topic is studied.

246. Seventeenth-Century Literature (4) III. Waddington 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) 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) I. Lokke 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. Dale 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. Hoffman, II. 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) 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) Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

260. American Literature: Civil War to 1914 (4) Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

262. American Literature after 1914 (4) Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

264. Studies in Modern British and American Literature (4) Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

285. Literature by Women (4) III. Stange 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 a different topic is studied.

290F. Seminar in Creative Writing of Fiction (4) I. Talledo, II. Budi 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 master's Program in English (Creative Writing). A workshop in the writing of literary non-fiction, with emphasis on the writing and presentation of non-fiction prose narratives.

290P. Seminar in Creative Writing of Poetry (4) I. McPherson; II. Gilbert; III. Williamson 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. 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 concurrently with practice teaching. Course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

390. Teaching English at the College Level (4) I. Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Consideration of the problems and techniques of teaching composition and literature at the college level. (S/U grading only.)

392. Teaching Internship in English (4) II. Director of Composition in charge) Supervised internships—4 hours. Prerequisite: graduate standing. In-class internship with English Department faculty. Specialized teaching techniques.

393. Problems in Teaching College Composition (2) I. Director of Composition in charge) Discussion—2 hours. Prerequisite: open to graduate students teaching composition in a variety of University courses including English A, 1, 3, 5, 50, 102, and 103. Designed for the relatively experienced student teacher who would profit from developing skills in specific areas. (S/U grading only.)

Professional Course

401. Editing California Quarterly (2) Seminar—2 hours; conference—1 hour. Prerequisite: participation in Creative Writing Program. Approved for graduate degree credit. Students will read all manuscripts submitted to California Quarterly and attend weekly editorial board meetings, choosing articles for publication. They will also participate in copy-editing, copy-reading, layout, and other aspects of journal production. May be repeated for a total of 6 units. (S/U grading only.)

---

Entomology

(College of Agricultural and Environmental Sciences)

Michael P. Parrella, Ph.D., Chairperson of the Department

Department Office, 367 Briggs Hall (916-752-0475)

Faculty

James R. Carey, Ph.D., Professor
Hugh Dingie, Ph.D., Professor
Sean S. Duffey, Ph.D., Professor
Lester E. Ehler, Ph.D., Professor
Bruce F. Eldredge, Ph.D., Professor
Mary L. Fley, Ph.D., Lecturer
Norman E. Gary, Ph.D., Professor
Larry Godfrey, Ph.D., Lecturer
Jeffrey Granetti, Ph.D., Professor
Bruce D. Hammock, Ph.D., Professor (Entomology, Environmental Toxicology)
Richard Karban, Ph.D., Associate Professor
Harry K. Kaya, Ph.D., Professor
Lynn S. Kinsey, Ph.D., Associate Professor
G. A. H. McClelland, Ph.D., Senior Lecturer
Susumu Maeda, Ph.D., Associate Professor
Fumio Matsumura, Ph.D., Professor (Entomology, Environmental Toxicology)
Robert E. Page, Ph.D., Professor
Michael P. Parrella, Ph.D., Professor (Entomology, Environmental Horticulture)
Christine Y. S. Pang, Ph.D., Professor
Richard E. Rice, Ph.D., Lecturer
Jay A. Rosenheim, Ph.D., Assistant Professor
Arthur Shapiro, Ph.D., Professor (Entomology, Evolution and Ecology)
Robbin W. Thorp, Ph.D., Professor
Philip S. Ward, Ph.D., Professor
Robert K. Wasmund, Ph.D., Professor
Frank G. Zalom, Ph.D., Lecturer

Emeriti Faculty

Oscar G. Bacon, Ph.D., Professor Emeritus
Richard M. Bichard, Ph.D., Professor Emeritus
Alber T. Gribarck, 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
Thomas E. Leigh, Ph.D., Professor Emeritus
Donald L. McClain, Ph.D., Professor Emeritus
Timothy Prout, Ph.D., Professor Emeritus
Francis M. Summers, Ph.D., Professor Emeritus

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, use 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 agricultural entomology, for example, could enroll in courses such as pest management, biological control of insects, and insect-host plant interactions.

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 internships 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 participate 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 with parentheses are required.)

English Composition Requirement—0-4
See College Requirement

Preparatory Subject Matter—46-47
Biochemistry (Biology Sciences 1A, 1B, 1C), 15
Chemistry (Chemistry 2A, 2B, 8A, 8B), 16

*Course not offered this academic year.
Courses in Entomology (ENT)

Lower Division Courses

10. Natural History of Insects (3) II. Kaya/Thorp 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 and relationship to man and animals, excluding man.

11. General Entomology (3) (I). Granet in charge Lecture—3 hours. Prerequisite: Biological Sciences 1A, Biology, or consent of instructor. Laboratory—2 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. Units 6

11.1. Functional Insect Morphology (3) I. 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. Units 4

12. Insect Physiology (4) III. Duffey, Hammock Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Physiology and development in entomology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiologic, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. Units 4

13. Insect Systematics (3) III. Ward Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Units 4


107. California Insect Diversity (5) III. Thorp, Kinsey Lecture—1 hour; laboratory—6 hours; fieldwork—6 hours. Insect diversity in the western United States. Emphasis on the survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years. Units 5

149. Field Taxonomy and Ecology (7) Extra-session summer. Ward Lecture—2 hours; laboratory—36 hours; six-week course. Prerequisite: an introductory course in entomology or consent of instructor. Study of insects in their natural habitats; their identification and ecology. Offered in alternate years. Units 3

110. Economic Entomology (4) III. Parrella Lecture—2 hours; laboratory—6 hours. Introductory course dealing with the identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage, and ornamental pest problems. Units 4

111. Insects and Human Affairs (3) II, III. McClendon Lecture—2 hours; discussion—1 hour; film/demonstration—1 hour. Prerequisite: course 100 or 110. Principles of integrated pest management with emphasis on arthropod pests in California crop systems. Definition of pest status, measurement of pest damage, and interactions between pests and plants. Integration of control practices. Use of insecticides within the IPM framework. Units 4

112. Biology of Aquatic Insects (4) III. Granet Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes. Units 4

113. Apiculture (3) III. Gary Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honeybees: communication, orientation, social organization, foraging activities, honey production, pollination activities. General Education credit: Nature and Environment. Units 3

114. Apiculture Laboratory (2) III. Gary Lecture—1 hour: laboratory—3 hours. Prerequisite: course 112. Units 2

130. 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. Insect pathogens, entomopathogenic nematodes, parasites, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management. Units 4

147. Evolution of Life on Earth (4) III. Kinsey Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 10 or Biological Sciences 10. Relationships between physical changes in the environment and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years. General Education credit: Nature and Environment. Units 5

153. Medical Entomology (4) I. McClelland 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 and their relationship to the ecology of arthropod-borne human diseases and principles of their control. General Education credit: Nature and Environment. Units 5

155. Biology of Parasitism (3) III. Washino in charge, Thesl (Medical Microbiology) Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. Units 5

156. Biology of Parasitism Laboratory (1) III. Washino in charge, Thesl (Medical Microbiology) Laboratory—3 hours. Prerequisite: course 155 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples from protozoan and metazoan fauna.
meltzian organisms along with various techniques used for paleoecology exemplify concepts presented in the lecture course.

192. Internship (1-12) II, III, extra session. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units of course work. Laboratory experience or fieldwork off and on campus in subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only)

197T. Tuition in Entomology (1-3) II, III, McClelland 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) II, III, summer. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) II, III, summer. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

200A. Conceptual Basis of Entomology: Basic Biology (4) II. Ward Lecture—4 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research on an emphasis on theoretical and fundamental aspects of natural selection, behavior, ecology, physiology, and biochemistry as related to the integration of insect populations. Provides the theoretical framework for course 200B.

200B. Conceptual Basis of Entomology: Application (4) III. Thorp, Gary Lecture—4 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with emphasis on the application of theoretical/conceptual outlooks from course 200A to epidemiology, biotechnology, biological control and integrated pest management for controlling insect pest problems concerning food, fiber, and health.

206. Ecology of Insect Parasitoids (4) II. Rosenheim Lecture—4 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 with empirical tests of ecological hypotheses emphasized. Offered in alternate years. (Same course as Population Biology 206)


219. Advanced Apiculture (4) III. Peng Lecture—6 hours; seminar—4 hours. Prerequisite: course 191L. Current topics in bee biology with special consideration of morphology, caste determination, queen rearing, nutrition, physiology, pathology, and products of honey bees. Offered in alternate years.

220. Chemical Ecology of Plant–Insect Interactions (4) II. Duffey Lecture—4 hours; discussion—1 hour. Prerequisite: Introductory biochemistry. Investigation of the interface between plants, herbivorous insects and their natural enemies from mechanistic point of view, stressing principles of biochemistry, physiology, and ecology, rather than those of ecology. Major emphasis is placed on plant natural products.

225. Terrestrial Field Ecology (4) III. Karban Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. Field course conducted over spring break and four weekends at Bedeguay Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results stressed.

230. Advanced Biological Control (3) III. Elsher Lecture—2 hours; discussion—1 hour. Prerequisite: course 135. Advanced treatment of current topics in biological control of arthropod pests and weeds. Offered in alternate years.

233. Advanced Medical Entomology (3) III. McClelland 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.

234. 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. McClelland, Washington Ridge Lecture—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

292. Seminar in Insect Physiology (2) I. Duffey, Hammer, Macad Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest to insect physiology and biochemistry.

293. Seminar in Insect Systematics (2) I. McClelland, Summary, Washington Ridge Seminar—2 hours. Prerequisite: course 103. Selected topics in systematics and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions.

294. Seminar in Insect Ecology (2) III. Carey, Efther, Karban Seminar—2 hours. Prerequisite: a general ecology course. Discussion of topics in ecology relevant to the study of insect populations in managed ecosystems. The course will cover ecological, evolution, population, and community ecology.

295. Seminar in Agricultural Entomology (2) II. Granett, Parshley, Rosenheim Lecture—2 hours. Prerequisite: course 110. Discussion of selected topics relating to the principles of pest insect population management.

296. Seminar in Bee Ecology (2) I, II, III. Page, Peng Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apidae) with emphasis on the honeybee.

297. Seminar in Insect Behavior (2) III, Gary, Dingle Seminar—2 hours. Prerequisite: a course in animal behavior. Review and analysis of current advances in insect behavior, especially interpretation and demonstration of observations, physiological mechanisms, functional kinds of behavior, and the application of general principles to the solution of problems in the laboratory and field.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only)

299. Research (1-12) I, II, III. summer. The Staff (Chairperson in charge) (SU grading only)

Professional Course

404. Grantsmanship (2) I. Granett, Duffey Lecture—1 hour; 15-20 page research proposal required. Prerequisite: graduate standing; research experience. Approved for graduate degree credit. Develops in students an awareness of options and strategies in writing research proposals. Students write a full-length research proposal.

Environmental and Resource Sciences

(4) Environmental and Resource Sciences

Faculty. See Under departments of Agricultural 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 physical, chemical and biological features of environmental resources, and the economic and social considerations associated with their use, conservation, protection, and management. Students choosing 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. An upper division general environmental resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required for all students in the major. Resource-oriented courses shall be selected in consultation with and approval of the student's advisor. Considerable care should be taken to ensure effective utilization of the flexibility of the major, and to meet individual academic and career objectives. Areas of specialization are achieved through selection of one of the options within the major.

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 of more comprehensive courses are acceptable. (Courses shown without parentheses are required.)

UNITs

Written/oral expression..............................11-12

See College requirement

English (English 1, 3, or 20)............................7-8

Rhetoric (Rhetoric and Communication 1..) ......4

Preparation Subject Matter............................14-63

Biological Sciences (Biology Sciences 1A-1B-1C) ........15

Chemistry (Chemistry 2A-2B-2C).....................10

Environmental quality (Environmental Toxicology 10) ..............3

Geology (Geology 1 or 50)............................3

Mathematics (Mathematics 16A-16B3 or 21A-2B) .........6-8

Microcomputer skills, computer programming (Agricultural Science and Management 21 and 121, Engineering 5, Computer Science Engineering 10, 15) ..............5

Physics (Physics 1A-119 or 5A-5E-5C—see option requirements) ....6-12

Statistics (Statistics 13) ..................4

*(Students are encouraged to take the advanced series—consult with your adviser.)
230 Environmental and Resource Sciences

<table>
<thead>
<tr>
<th>Breadth/General Education</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction of graduation requirements; additional units in social sciences and humanities to total 24 units</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>24-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written expression (in addition to college requirement)</td>
<td>130E, 104</td>
</tr>
<tr>
<td>Agricultural Economics</td>
<td>147 or 148</td>
</tr>
<tr>
<td>Soil Science 100</td>
<td></td>
</tr>
<tr>
<td>Water Science 100</td>
<td></td>
</tr>
<tr>
<td>Social-political science (Environmental Studies 161, 179, Environmental Toxicology 138, Geography 161, Geology 134, Wildlife and Fisheries Biology 154)</td>
<td></td>
</tr>
<tr>
<td>Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 160, Plant Science 101, Zoology 125)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Areas of Specialization (choose one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Resources Option</td>
</tr>
<tr>
<td>For the general study of the physics, 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 utilization and management, and those pursuing post baccalaureate, academic, or professional training</td>
</tr>
<tr>
<td>Statistics (Agricultural Science and Management 150, Environmental Studies 123)</td>
</tr>
<tr>
<td>Environmental and Resource Science 192</td>
</tr>
<tr>
<td>Upper division resource-oriented courses chosen in consultation with and approved by advisor</td>
</tr>
<tr>
<td>Environmental and Resource Science upper division breadth courses (choose from the following areas)</td>
</tr>
<tr>
<td>Agricultural economics</td>
</tr>
<tr>
<td>Agronomy and range science</td>
</tr>
<tr>
<td>Agricultural science</td>
</tr>
<tr>
<td>Range management</td>
</tr>
<tr>
<td>Agriculture economics</td>
</tr>
<tr>
<td>Environmental science</td>
</tr>
<tr>
<td>Environmental Toxicology</td>
</tr>
<tr>
<td>Geology</td>
</tr>
<tr>
<td>Hydrology</td>
</tr>
<tr>
<td>Entomology</td>
</tr>
<tr>
<td>Wildlife and Fisheries Biology</td>
</tr>
<tr>
<td>Studies and research</td>
</tr>
<tr>
<td>Plant Science 101</td>
</tr>
<tr>
<td>Zoology 125</td>
</tr>
</tbody>
</table>

| 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) and economic effects of existing technologies |
| Appropriate preparation for careers with engines, producing and energy conversion industries |
| Environmental Studies 1, 126, 167, 169 (select three courses) | 12 |
| Atmospheric Science 133 | 3 |
| Hydrology 121 | 3 |
| Radiological Science 115 | 3 |
| Environmental and Resource Science 3 | 3 |
| Environmental and Resource Science 103 | 3 |
| Environmental and Resource Science 192 (Internship) | 3 |

| Unrestricted Electives | 25-40 |
|-----------------------|
| 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 nutrient requirements and principles of irrigation and drainage is particularly appropriate for those seeking employment with state and federal agencies or as agronomists |
| Soil Science 109 | 4 |
| Soil Science 118 | 4 |
| Water Science 108 | 4 |
| Water Science 104 | 4 |
| Soil Science 192 or Water Science 192 (Internship) | 3 |

| Additional Soil Science or Water Science courses with advisor's approval | 8-10 |

| Unrestricted Electives | 25-44 |
|-----------------------|
| 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 protection |
| Water Science 122, 123 | 5 |
| Botany 118, 150 | 3-5 |
| Entomology 117 | 5 |
| Wildlife and Fisheries Biology 120, 121 | 4 |
| Water Science 108 | 3 |
| Water Science 192 (Internship) | 3 |
| Additional electives (Environmental Studies 123, Water Science 41, Wildlife and Fisheries Biology 153, Environmental Studies 151 and 151L, Water Science 150, Environmental Toxicology 101, Water Science 141) | 6-10 |

| Unrestricted Electives (to total 180) | 18-36 |

| Total Units for the Major | 180 |

| Related Courses | 180 |
|-----------------|
| For courses that are related to this major see course listings for Agricultural Economics, Agricultural Systems and Environment, Animal Science, Environmental Science, Environmental Toxicology and Management, Environmental Studies, Environmental Toxicology, Evolution and Ecology, Geography, Geology, Plant Biology, Range Management, Soil Science, Water Science, Wildlife and Fisheries Biology |
| Major Advisor: J. Rasen (210 South Hall) |
| Advising Center for the major is located in 122 Hoagland Hall (916-752-1869) |

<table>
<thead>
<tr>
<th>Courses in Environmental and Resource Sciences (ERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (916-752-1869)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lower Division Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Concepts in Forestry (3)</td>
</tr>
<tr>
<td>Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Chemistry 10. Introduction to the biological, physical, and ecological factors that give the forest its characteristic and examination of social and environmental factors governing forest management. General Education credit: Nature and Environment</td>
</tr>
<tr>
<td>3 Energy and the Environment (3)</td>
</tr>
<tr>
<td>Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 10, Chemistry 10, Physics 10 or one equivalent course. Energy resources, their global distribution and the social, economic, political and environmental factors influencing utilization. Roles of hydro, solar, geothermal, nuclear, and fossil fuels in meeting California's energy requirements. General Education credit with concurrent enrollment in course 3G. Natural and Environmental</td>
</tr>
<tr>
<td>3G Energy and the Environment Discussion (1)</td>
</tr>
<tr>
<td>Lecture—1 hour. Prerequisite: course 3 concomitantly. Critical, methodological, and analytical study of issues dealing with energy-environment interactions. General Education credit with concurrent enrollment in course 3. Nature and Environment</td>
</tr>
<tr>
<td>3L Energy, Society and Environment Laboratory (2)</td>
</tr>
<tr>
<td>Lecture—1 hour; laboratory—3 hours; Saturday field trip. Prerequisite: course 3. Field trips to examine nuclear, solar, fossil fuel, hydroelectric, wind, geothermal and cogeneration energy conversion facilities.</td>
</tr>
</tbody>
</table>

10. California: The State (3) | I, III. Brenchley-Jackson |
| Lecture—3 hours. Prerequisite: introductory geology or geography recommended. Introduction to geology, physical features and natural resources of California. Interrelated impacts of terrain, climate and resources on human activities. Analysis of the fundamental concepts and methods of inquiry guiding existing resource management policies. General Education credit with concurrent enrollment in course 103. Contemporary Societies |

103. California: The State (Discussion) | I, II, III. Brenchley-Jackson |
| Discussion—1 hour; brief essays. Prerequisite: course 10 concurrently. Small group discussion of topics assigned for course 10. Preparation and discussion of essays. General Education credit with concurrent enrollment in course 103. Contemporary Societies |

92. Resource Sciences Internship (1-12) | I, II, III. The Staff (Chairperson in charge) |
| Internship—36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off campus in resource sciences. Internship supervised by a member of the faculty. (P/N 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/N grading only) |

99. Special Study for Undergraduates (1-5) | I, II, III. The Staff (Chairperson in charge) |
| (P/N grading only) |

Upper Division Courses |

103. Renewable Energy Resource (3) | I. Fochetti |
| Lecture—3 hours. Prerequisite: course 3. Characteristics of solar energy; energy balance of structures; analysis of systems for heating and air; air conditioning systems; electricity from the sun; biomass conversion, wind power |

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. General Education credit: Nature and Environment |

131. Air as a Resource (3) | I. Fochetti |
| 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. General Education credit: Nature and Environment |

192. Resource Sciences Internship (1-12) | I, II, III. The Staff (Chairperson in charge) |
| Internship—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/N grading only) |

198. Directed Group Study (1-5) | I, II, III. The Staff (Chairperson in charge) |
| (P/N grading only) |

199. Special Study for Advanced Undergraduates | I-5 | I, II, III. The Staff (Chairperson in charge) |
| Prerequisite: consent of instructor. (P/N grading only) |
Environmental Biology and Management

(Faculty of Agricultural and Environmental Sciences)

See under the Division of Environmental Studies.

The Major Program

The environmental biology and management major offers an education in 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. Courses in ecology, environmental policy, and policy are then tied together by courses in ecology. Courses in statistics, and other methods courses give students the basic quantitative research skills in economics, political science, and techniques of quantitative management offerings dominate the management and public policy requirements.

A moderate degree of specialization is permitted in two upper division options. Students in the Environmental Biology option take courses in population ecology, environmental science, and other biological specialities, 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. The 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 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 advisor early to plan for the real, i.e., such as organic chemistry. Graduates who choose the Environmental Biology option are prepared for graduate or professional training and, eventually, careers working for public agencies or 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 advisor's written approval. Courses shown without parentheses are required.) Students will be required to plan their course selection with their advisor.

UNITS

English Composition Requirement ..............................................6-15

See College Requirement ..........................................................1-2

Preparatory Subject Matter .........................................................6-15

Biology courses (Biological Sciences 1A, 1B, 1C) ..........................15

Chemistry (Chemistry 2A-2B or 2AH-2BH) .................................10

Computer science (Agricultural Science and Management 125 or Computer Science Engineering 10, 15, or 30) .........................3-4

Environmental analysis (Environmental Studies 1 or 30) .......3-4

Policy analysis (Political Science 1, or Economics 1A, if Environmental Management option is selected) .................................4-5

Mathematics (Mathematics 1A or 1B) .................................6-9

Physics (Physics 5A-5B or 9A-9B) ........................................6-9

Breadth/General Education ...................................................12-24

Satisfaction of General Education requirement to include 2 units of humanities and/or 2 units of social sciences .....12-24

Depth Subject Matter ...............................................................26-32

(These units must be taken for a letter grade with an overall grade-point average of 2.0 or higher.)

Ecology (Select one of Botany 117, Environmental Studies 100, Wildlife and Fisheries Biology 150, Zoology 125) .........................3-4

Survey of environmental science, Environmental Studies 110 ..........................................................4

Physical processes in the environment (Select two courses from: Atmospheric Science 120, Environmental Science 100A, Natural Resources 101, Geology 134, 153, 154, Soil Science 100, Water Science 141) ..................................................6-8

Environmental Policy (Select one course from: Environmental Studies 161, 162, 163, 166, 171, 179, Agricultural Economics 147, 175, 176) ..................................................3-4

Management of Public Lands, Environmental Studies 172 ..........................................................4

Mathematics and/or Statistics (Select one course from: Mathematics 16C, 21C, 22A, 22B, Agricultural Science and Management 120, Statistics 102 or upper division mathematics, computing or statistics.) Environmental Management students should enroll in Agricultural Science and Management 150 or Statistics 102 3-4

Research methods (Environmental Studies 123, 126, 175, Wildlife and Fisheries Biology 100, Management students should enroll in Environmental Studies 179 ..................3-5

Areas of Specialization ...............................................................25-38

Environmental Biology Option

Behavioral ecology (Choose one from: Anthropology 154A, Entomology 104, Psychology 150, Wildlife and Fisheries Biology 140, Zoology 137, 155) .................................3-5

Evolution and genetics (Choose one from: Genetics 102, 103, Genetics 107, Zoology 149) ..........................................................3-4

Quantitative analysis (Mathematics 22A-22B, zoo) upper division mathematics or statistics) ..........................................................6-8

Taxonomy, including laboratory experience (Botany 102, 108, 116, Entomology 103, Wildlife and Fisheries Biology 110, 111, 11L, 120, Zoology 112-112L, 135, 133) ..................................................4-8

Physiology, including laboratory experience. Choose from: Botany 111, Entomology 102, Environmental Studies 129, Physiology 110, Wildlife and Fisheries Biology 121 ..................................................3-5

Advanced environmental biology. Choose two courses from the following: Avian Science 100, Botany 101, 102, 117, 144; Environmental Studies 112, 151, 151L, 150F, 150C, 155, 155L, Geography 173; Water Science 122, 125; Wildlife and Fisheries Biology 100, 122, 122A, 130; Zoology 149 ..................................................6-8

Environmental Management Option

Resource policy evaluation, Environmental Studies 162 ..........................................................4

Microeconomics, Economics 100 or Agricultural Economics 100A ..........................................................5

Bureaucratic policy making, Environmental Studies 166, Political Science 108, 109 .................4

Forest and Range Lands Resources: Environmental and Resource Science 1, or Range Science 133, 134, Air, Water, and Soil Resources: Environmental and Resource Science 131, or Water Science 41, 103, 122, 141, or Geography 162, or Soil Science 118, or Environmental Studies 151 and 151L, 155 and 155L ..........................................................6-8

Unrestricted Electives ...............................................................20-62

Total Units for the Degree .......................................................180

Minor Adviser: J. F. Quinn (Environmental Studies).

*Most of these courses require one or two additional chemistry or basic physics courses as prerequisites. Plan a sequent consultation with adviser.

Minor Program Requirements:

The faculty for Environmental Biology and Management offers a minor in Recreation for students in Landscape Architecture desiring to specialize in recreation area design; Physical Education, Psychology, Sociology, and Human Development, and Applied Behavioral Sciences 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 ...............................................................15-20

Resource economics, (Agricultural Economics 147, 175, Economics 123) .................................3-4

Urban recreation programs (Environmental Planning and Management 134, Physical Education 150) ..........................................................3-4

Recreation policy analysis, Environmental Studies 182 ..........................................................4

Recreation administration, (Agricultural Economics 112, Applied Behavioral Science 163, 170, Political Science 183, 189) ..........................................................4

Internship in Recreation Management, Environmental Studies 192 ..........................................................4

Minor Adviser: R. A. Johnston (Environmental Studies.

Courses in Environmental Biology and Management

Questions pertaining to courses in Environmental Biology and Management should be directed to the Environmental Biology and Management office, 2134 Wickersham Hall. See also Environmental Planning and Management listing following Environmental Horticulture.
Environmental Design

(College of Agricultural and Environmental Sciences)
Robert Sommer, Ph.D., Chairperson of the Department
Robert L. Thayer, Jr., M.A., Associate Chair, Landscape Architecture
JoAnn Stabb, M.A., Associate Chair, Design
Department Office, 144 Walker Hall (916-752-6223)

Faculty
Richard Bertaux, B.A, M.S., Associate Professor
Francis Butler, Ph.D., Professor
Kerry J. Dawson, M.A., Professor
Mark Francis, M.A., Professor
Dolph Gotelli, M.A., Associate Professor
Patricia Harrison, M.A., Assistant Professor
Gerry Laky, M.A., Assistant Professor
E. Byron McCulley, B.S.L.A., Lecturer
Edward S. McNeil, M.L.A., Lecturer
Heige B. Olsen, Senior Lecturer
Patsy E. Owens, M.A., Assistant Professor
Susan Palmer, M.A., Lecturer
Victoria Z. Rivers, M.A.C.T., S.T.C., Professor
Barbara Shawcroft, M.F.A., Professor
Heath Scherker, M.A., Assistant Professor
Kathryn Sylva, M.F.A., Lecturer
JoAnn C. Stabb, M.A., Senior Lecturer
Robert L. Thayer, Jr., M.A., Professor

Emeritus Faculty
Katherine W. Rosstbach, M.A., Professor Emerita

Programs of Study. See the majors in Design and Landscape Architecture.

Related Courses. See Design and Landscape Architecture course list.

Environmental Horticulture

(College of Agricultural and Environmental Sciences)
James A. Harding, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (916-752-0130)

Faculty
Alison M. Berry, Ph.D., Associate Professor
David W. Burger, Ph.D., Associate Professor
Thomas G. Byrne, M.S., Lecturer
Don J. Duran, M.P.H., Professor
Richard Y. Evans, Ph.D., Lecturer
Seymour M. Gold, Ph.D., Professor
James A. Harding, Ph.D., Professor
Charles E. Heiss, Ph.D., Professor
J. Heinrich Lieth, Ph.D., Associate Professor
James D. MacDonald, Ph.D., Associate Professor
(Plant Pathology)
Carolyn Napoli, Ph.D., Assistant Professor
Michael P. Priorella, Ph.D., Associate Professor
(Entomology)
Michael S. Reid, Ph.D., Professor
Roy M. Sachs, Ph.D., Professor
Lin L. Wu, Ph.D., Professor

Emeritus Faculty
Richard W. Harris, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Anton M. Kafri, Ph.D., Professor Emeritus
Harry C. Kohl, Jr., 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

The Program. Students in Environmental Horticulture learn how plants improve the environment and the quality of our lives. Plants are used to revitalize 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 obtain a B.S. degree in Plant Science with specialized options in Ornamental Landscape Architecture or Landscape Horticulture (see listings under Plant Science). Students can choose an individual major with the help of an Environmental Horticulture faculty advisor 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.

Related Undergraduate Programs and Graduate Study. See the undergraduate majors in Environmental Biology and Management, and Plant Science; and for graduate study, refer to the Graduate Studies section.

Related Courses. See Plant Science.

Minor Program Requirements:

| Environmental Horticulture | 22-24
| Environmental Horticulture B.S.  | 3
| Plant Science 109  | 4

Select one of the following courses:

| Environmental Horticulture 105  | 4
| Environmental Horticulture 107  | 4

*Course not offered this academic year.

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.

Minor Program Requirements:

| Environmental geology  | 23-25
| Geology 130, 134, and 152 or Geography 106  | 10
| Soil Science 118  | 4
| Water Science 141 or Civil and Environmental Engineering 142  | 3

Two courses chosen from:

- Environmental Studies 160, 171, 179
- Geology 135, 154 or Geography 108
- Environmental and Resource Sciences 100
- Water Sciences 149 6-8

Minor advisor: Robert A. Matthews, Department of Geology, 397 Physics/Geology, 752-0179.

Courses in Environmental Horticulture (ENH)

Lower Division Courses

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) I. Burger

| 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 Science 2 or 10, and consent of instructor. Work experience off and on campus in flower and nursery crop production, and marketing; landscape horticulture, and park management. Internships supervised by a member of the faculty. (P/N grade only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)

| (P/N grade only) |

Upper Division Courses

105. Taxonomy and Ecology of Ornamental Plants (4) III. Harding

| Lecture—2 hours | Laboratory—6 hours | Prerequisite: course 6 or Biological Sciences 1C. Classification and identification of exotic and native species used in the western landscape. Emphasis on plant adaptations to environmental variation, patterns of morphological and phytochemical relationships, and plants that are important factors in the human environment.

107. Herbaceous Environmental Plants (4) III. Harding

| Lecture—2 hours | Discussion—1 hour | Laboratory—3 hours |

Prerequisite: introductory course in environmental plants (course 6) or in plant taxonomy (Botany 108). Evolutionary relationships, hybridization, selection and cultural uses of herbaceous, ornamental plants, and emphasis on family characteristics and genetic and environmental differences. Plants are identified with the use of taxonomic keys.

120. Management of Container Soils (3) I. The Staff

| Lecture—2 hours | Laboratory—3 hours | Prerequisite: Soil Science 100. Appropriate use of sand, mineral soil, and amendments to formulate container soils. Management of container soils emphasizing irrigation, salinity control, and fertilizer practices.

125. Greenhouse and Nursery Crop Production (5) II. Napole

| Lecture—3 hours | Discussion—1 hour | Laboratory—3 hours |

Prerequisite: Plant Science 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

130. Turfgrass Culture (3) III. Wu

| Lecture—2 hours | Laboratory—3 hours | Prerequisite: Plant Science 2 or Biological Sciences 1C and Soil Science 100. Professional turfgrass culture and management emphasizing turfgrass species and cultivars, physiological differences among turfgrass species, the interaction between turfgrass and the environment, and management practices.
133. Woody Plants in the Landscape: Growth, Ecology and Management (4) II. Berry Lecture—4 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: Biological Sciences 110 or equivalent preparation in plant biology. Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form, growth response and adaptation, tree management in relation to soil, moisture, climate, and plant problems.

192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units. Two upper-division courses in Environmental Horticulture appropriate for the internship, and consent of instructor. Work experience off and on campus in flower production and marketing, nursery crop production and marketing, landscape horticulture, and park management. Internships supervised by a member of the faculty. (FINP grading only.)

197T. Tutoring in Environmental Horticulture (1-4)
I, II, III. The Staff (Chairperson in charge)
Tutoring—4 hours. Prerequisite: upper division standing, completed course or the equivalent being tutored, and consent of instructor. Leading discussion sections, grading and tutoring exercises or quizzes in individualized instruction format classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated once for credit. (FINP grading only.)

198. Directed Group Study (1-5)
I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (FINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (FINP grading only.)

Graduate Courses

220. Tree Biotechnology (2) II. Durzan Lecture—2 hours. Prerequisite: Bachelors or Masters degree in a plant science discipline (botany, plant physiology, genetics, horticulture, related fields). Development 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. (SU grading only.)

290C. Research Group Conference (1) I, II, III.
Berry, Leith, Napier, Reid, Sacs, Wu 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 include plant morphogenesis, floriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, plant breeding related to environmental horticulture. (SU grading only.)

297T. Tutoring in Environmental Horticulture (1-4)
I, II, III. The Staff (Chairperson in charge)
Tutoring—4 hours. Discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and/or consent of instructor. Leading discussion sections, 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)
Prerequisite: graduate standing. (SU grading only.)

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. Students interested in this major should apply to the Exploratory Program. Applications to the major are accepted from exploratory students on a continuing basis.

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 persons 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 advisor. Courses shown without parentheses are required.)

English Composition Requirement..................10-11
See College requirement............................8
Additional English (English 102 concurrently with Environmental Studies)..................3

Preparatory Subject Matter.............................81-88
Biological sciences (Biological Sciences 1A or 1B).................................4-4
Chemistry (Chemistry 2A, 2B)............................10
Computer science (Agricultural Science and Management 21, Engineering 5, Computer Science Engineering 5, 10).................................3-4
Economic principles (Economics 1A, 1B).................................10
Environmental science/agriculture (Animal Science 1, Biological Sciences 1B, Geography 1, Geology 1, Plant Science 10, Soil Science 100, Water Science 120-124).................................3-5

Environmental studies (Environmental Studies 100-102, 103, 120-124).................................3-5

Mathematics (Mathematics 16A-16B or 21A-21B).................................6-8
Physics (Physics 1A).................................3
Economic principles (Economics 1A, 1B).................................3-4
Statistics (Statistics 13, 32).................................3-4

Breadth/General Education Requirement.................................6-24
Satisfaction of General Education requirement.................................6-24

Depth Subject Matter.................................37-40
(Students must take these units on a letter grade basis, and must obtain an overall grade-point average of 2.00 or higher in the Depth Subject Matter courses.)

Core Courses

Environmental studies 160.................................4
Environmental studies 161, 162, or Water Science 150.................................3-4
Environmental studies 166.................................4
Environmental studies 168A.................................5
Environmental studies 171 or 179.................................3-4
Environmental studies 110.................................4
Environmental studies 164.................................4

Research Methods

Environmental studies 178; or Sociology 103.................................4
Sociology 106 or Agricultural Economics 106 or Statistics 108.................................3-4

Economic Analysis

Economics 100, Agricultural Economics 103A, or Environmental Engineering 153, 160, Agricultural Economics 155, Economics 125, 130).................................3-4

*Course not offered this academic year.
City and Regional Planning Option
Urban design (Art History 168, Environmental Biology and Management 110, Landscape Architecture 40 recommended). 3-4
Urban geography (Geography 155, 156). 4
Transportation planning (Civil and Environmental Engineering 160). 3-4
Environmental studies (Environmental Science 118, Environmental Studies 179). 3-4
Urban economics (Economics 125). 4
Urban politics (Political Science 102, 103). 4 (Enroll for Environmental Studies 173 for law requirement under Depth Subject Matter above.)

Energy Policy Option
Environmental health (Environmental Studies 126, 128). 3
Nuclear hazards (Environmental Studies 115). 3
Energy technology (Engineering 160, 162). 4
Solar energy (Environmental and Resource Sciences 103). 3
Economics of energy (Environmental Studies 175). 4
Energy policy (Environmental Studies 167). 4

Environmental Science Option
Students choosing the Environmental Science area of specialization must consult with a faculty adviser to identify the emphasis within the specialization and select suitable courses. The major 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 Studies 140. 4
Public land management. Environmental Studies 172. 4
Urban recreation programs (Civil and Environmental Engineering 160). 3
Recruitment policy analysis, Environmental Studies 162. 4
Recreation administration (Agricultural Economics 112, Applied Behavioral Science 163, 170, Political Science 183, 188). 4

Transportation Planning Option
Urban structure (Geography 155, 156, Economics 125). 4
Transportation planning (Civil and Environmental Engineering 160). 3
Transportation engineering and analysis (Civil and Environmental Engineering 161, Environmental Studies 168). 3-4
Energy policy (Environmental Studies 167, Engineering 160). 4
Air quality (Environmental and Resource Sciences 131). 4
Energy and environmental aspects of transportation (Environmental Studies 163). 3

Water Quality Option
Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 162). 4
Water pollution (Water Science 41, Soil Science 120). 2-3
Freshwater systems (Water Science 122, Environmental Studies 151). 3-4
Field and laboratory methods (Water Science 122L, Environmental Studies 151L). 2-3
Water chemistry (Water Science 103, 180). 3-4
Hydrology (Water Science 141). 3
(Enroll for Water Science 150 for law requirement under Depth Subject Matter above.)

Unrestricted Electives 24-59
Total Units for the Degree 180

Major Adviser: S.I. Schwartz (Environmental Studies)

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 applicable to energy systems. The second minor is intended for natural and social science students desiring basic training in policy analysis theory and methods.

Energy Policy 3-4
Preparation: Economics 1A; basic course in political science
Environmental Studies 126 or Environmental Toxicology 101. 4
Environmental and Resource Sciences 103 or Environmental Studies 115. 3
Environmental Studies 169. 4

Environmental Policy Analysis 3-4
Preparation: Economics 1A; basic course in political science
Environmental Studies 110, 160, 161, 166, 168A. 20
Environmental Studies 171 or 179. 3-4
Minor Adviser: S.I. Schwartz (Environmental Studies)

Environmental Studies
(Intercollge Division)
Alan M. Hastings, Ph.D., Chairperson of the Division
Division Office, 2132 Vickson Hall (916-752-3028)

Faculty
Theodore C. Foin, Jr., Ph.D., Professor
Charles R. Goldman, Ph.D., Professor
Susan Harrison, Ph.D., Assistant Professor
Alan M. Hastings, Ph.D., Professor
Robert A. Johnston, M.S., Professor
John B. Loomis, Ph.D., Associate Professor (Environmental Studies, Agricultural Economics)
Benjamin S. Orlove, Ph.D., Professor
Mark R. Patterson, Ph.D., Associate Professor
Thomas M. Powell, Ph.D., Professor
James F. Quinn, Ph.D., Associate Professor
Eliska Reymarkova, Ph.D., Assistant Professor
Peter J. Richerson, Ph.D., Professor
Paul A. Sabatier, Ph.D., Professor
Thomas W. Schoenig, Ph.D., Professor (Evolution and Ecology)
Christine Schornack-Coxx, Ph.D., Assistant Adjunct Professor
James E. Cohen, Ph.D., Professor (Environmental Studies, Agricultural Economics)

Emeriti Faculty
William J. Hamilton, III, Ph.D., Professor Emeritus

The Program of Study
The intercollegiate Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The Division offers Bachelor of Science degrees in Environmental Biology and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Studies 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 Division regarding individual majors in the College of Agricultural and Environmental Sciences (see Individual Major in the Programs and Courses section).

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the Division develops each year a variety of special courses and workshops that cannot be listed here. Students are advised to check with the Division 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 Division offers graduate instruction in the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as through the graduate programs of the disciplines with which they are affiliated, such as agricultural economics, zoology, 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: T.C. Foin (Ecology)

Courses in Environmental Studies (EST)

Lower Division Courses
1. Environmental Analysis (4) II, Loomis, Quinn Lecture—3 hours; discussion—1 hour. Prerequisite: English 1, English 102, Economics 1A, 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) I, Wardensford-Smith, C. Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the interactions of ecosystem 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 which require individual reading in environmental problems. Not open for credit to those who have had course 1. General Education credit: Contemporary Societies.

30. The Global Ecosystem (3) III, Richerson. Lecture—3 hours; 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 uses of their biotic resources. General Education credit with concurrent enrollment in course 30G. Nature and Environment.


92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisites: 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) 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. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biological systems and applications to selected human ecological problems.  

#### 101. Human Ecology (4) II. Richardson, Mulder  
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from 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 that encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) General Education credit: Contemporary Societies.  

#### 110. Principles of Environmental Science (4) II.  
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. In-depth exploration of analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.  

#### 115. Bioenvironmental Consequences of Nuclear Technology (3) II. Raabe  
Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology. Biospheric implications of radio-nuclide and thermal effluents generated by nuclear technology. Hazards evaluated based on predictions of the most sensitive physiological response. Offered in alternate years.  

#### 116. The Oceans (3) I. Sporer, II. The Staff  
Lecture—3 hours. Introductory survey of the marine environment, with emphasis on physical phenomena, chemical constituents, geological history, the sea’s biota, and utilization of marine resources. (Same course as Geology 116.) General Education credit.  

#### 116G. The Oceans: Discussion (2) I. Sporer, II. The Staff  
Discussion—2 hours. Prerequisite: course 116G/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. General Education credit with concurrent enrollment in course 116G. Nature and Environment. (Same course as Geology 116G.)  

#### (b) Ecological Analysis  
121. Population Ecology (4) II. Hastings  
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. Dynamics of growth 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.  

#### 123. Introduction to Field and Laboratory Methods in Ecology (4) III. The Staff  
Lecture—2 hours; laboratory—6 hours; two weekend field trips. Prerequisite: Statistics 13, course 100 (may be taken concurrently). Laboratory introduces students to methods used for collecting ecological data in field and laboratory situations.  

Methods used by population ecologists and community ecologists are included and emphasis will be placed 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.  

#### 125. Social Systems of Animals and Humans (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or the equivalent recommended. The nature and interpretation of animal social systems, and their relevance to an understanding of man’s social conventions and evolution. Aggression, dominance, communication, sexual behavior, cooperation, and social regulation of density are considered from an evolutionary perspective.  

#### 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; Prerequisites: 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. Simulational modeling using DYNAMO. Students complete a series of exercises from model formulation to model experiments and develop a term project of their own choosing.  

#### 129. Physical Biology (3) III. The Staff  
Lecture—3 hours; Prerequisites: Chemistry 2B, Physics 1B, and Biological Sciences 1A and 1B. Comparative and evolutionary study of organismic responses and adaptations to the physical and chemical environment. Body size and metabolism, gas and nutrient exchange, thermoregulation, biomechanics, locomotion, and selected topics in current research.  

#### 129L. Physiological Ecology Laboratory (3) III. The Staff  
Laboratory—6 hours. Prerequisite: course 129 (may be taken concurrently) or the equivalent. Methods for monitoring physical variables in aquatic and terrestrial environments and animal responses to them. Water balance, respiration, and thermoregulation are demonstrated and a broadly comparative approach is considered. Enrollment limited.  

#### (c) Cultural Ecology  
133. Cultural Ecology (4) I. Olof  
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 recent complex environments. (Same course as Anthropology 133.) General Education credit: Contemporary Societies.  

#### (d) Aquatic Ecosystems Analysis  
150A. Physical and Chemical Oceanography (4) I. Powell  
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/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 geo-chemical cycles. (Same course as Geology 150A.)  

150B. Geologic Oceanography (3) II. McDaniel (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, deep-sea hydrothermal and 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 planktonic communities. Existing knowledge and contemporary issues in marine biology. 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 (3) 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) II. 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 and laboratory analysis, and 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 168 or Political Science 182. 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 101, 10, 110). Course prerequisite: course 155 or 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. General Education credit: Contemporary Societies.  

162. Recreation Policy Analysis (4) III. Loomis  
Lecture—3 hours; discussion—1 hour. Prerequisites: course 1; Agricultural Economics 147 or 176; Environmental Biology and Management 127. Introduction to

---

*Course not offered this academic year.*
major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of political science and economics are applied to the analysis of recreation demand and provides for the design and management of conflicts between recreation and other uses. Offered in alternate years.

163. Energy and Environmental Aspects of Transportation (4) Cr. 3.
Lecture—3 hours. Prerequisite: Civil Engineering 160 recommended. Application of engineering, economic, and system planning concepts. Analysis of energy, air quality, and other selected environmental attributes of transportation. Development of strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. (Same course as Civil Engineering 163.)

164. Ethical Issues in Environmental Policy (4) II. Sabatier
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 160, 158; seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria for distributive justice applied to selected topics in environmental policy making.

165. Science, Experts and Public Policy (4) II. Craig
Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 162 or Political Science 108 recommended. Analysis of factors affecting the influence of scientists, planners, and other experts in policy making. Several cases and controversies will be examined.

166. Policy-making in Natural Resource Agencies (4) I. Sabatier
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. Emphasis on critical evaluation of written materials. General Education credit: Contemporary Societies.

167. Energy Policy (4) I. Johnston
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: science, technology, policy, and politics. Offered in alternate years.

168. Methods of Environmental Policy Evaluation (5) I. Schwarzwolf
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 13; Economics 100 or Agricultural Economics 100A; Mathematics 163 or 21B; and course 1; upper division standing. Evaluation of alternatives for solutions of complex environmental problems; impact analysis, benefit-cost analysis, distribution analysis, decision making under uncertainty, and multiobjective evaluation.

169. Methods of Environmental Policy Analysis (4) III. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 166A. Continuation of course 166A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of land use, water and air pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project.

(1) Environmental Planning

171. Environmental Planning (4) III. Johnston
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in political 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 used. Technical and problems technical and problems seen to all planning processes emphasized.

172. Public Lands Management (4) I. Loomis
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 legislative plays in determining the range of resource allocations.

173. Public Mechanisms for Controlling Land Use (4) III. Johnston
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, English 1, Political Science 1, and Economics 1A. Politics and administration of zoning, subdivision and building regulation; and open space preservation, constitutional and legal bases for controls; community and political factors influencing legislation and administration of controls; and the relative effectiveness of specific controls in channeling urban growth.

175. Natural Resource Economics (3) II. Wiesen
Lecture—3 hours. Prerequisite: courses 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources, ground water, forests, fisheries and wildlife populations, and non-renewable resources (minerals and energy resources, soil). Same course as Agricultural Economics 175.

178. Applied Research Methods (4) I. Loomis
Lecture—4 hours. Prerequisite: Statistics 103 or Sociology 108. 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 10, 110, Environmental Toxicology 10, or Resource Sciences 100. Methods for analysis used in environmental impact reporting. Emphasis on effective writing; review and management of impact reports in the context of rational democratic decision making.

(g) Other Courses

190. Workshops on Environmental Problems (1-8)
I, II, III. The Staff (Chairperson in charge)
Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops focusing on 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 qualified undergraduates and graduate students on application. (P/NP grading only)

192. Internship (1-12)
I, II, III. The Staff (Department Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 48 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)

196. Directed Group Study (1-5)
I, II, III. The Staff (Chairperson in charge)
(P/NP grading only)

199. Special Study for Advanced Undergraduates (1-3)
I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

212A. Environmental Policy Analysis (4) I. Sabatier
Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: Public Policy (e.g., Political Science 107 or 108), course in bureaucratic policy making (e.g. course 166 or Political Science 181) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in alternate years. (Same course as Ecology 212A.)

212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz
Lecture—1 hour; discussion—1 hour; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 168A (or the equivalent course in policy analysis or resource economics), intermediate level statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Ex ante and ex post evaluation will be studied. Offered in alternate years. (Same course as Ecology 212B.)

228. Advanced Simulation Modeling (3) III. Foin
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L, Statistics 108 or Agricultural 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.

229. Modelling Laboratory (3) III. Foin
Laboratory—2 hours; modeling and computing—7 hours. Prerequisite: courses 128-128L; course 226 concurrently. Continuation of course 128. Students expected to complete series of exercises on advanced topics in modeling and a term project based on their graduate research.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (SU grading only)

Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Takekuro Shibamoto, Ph.D., Chairperson of the Department
Department Office, 4138 Meyer Hall 916-752-1142

Faculty

Michael S. Derin, Ph.D., Assistant Professor
Bruce D. Harnock, Ph.D., Professor
(Environmental Toxicology, Entomology)
Dennis P. H. Haehl, Ph.D., Professor
Theodore L. Hurlan, Ph.D., Professor
Fumio Matsumura, Ph.D., Professor
Marion G. Miller, Ph.D., Associate Professor
Clayton A. Reece, M.S., Lecturer
Robert H. Rice, Ph.D., Professor
James N. Seiber, Ph.D., Professor
Takekuro Shibamoto, Ph.D., Professor
Michael W. Sennemann, Ph.D., Lecturer
Barr 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
Wendell W. Kligore, Ph.D., Professor Emeritus
Ming-yu Li, Ph.D., Lecturer Emeritus
Wray W. Winterton, M.S., Lecturer Emeritus

The Major Program

Students in environmental toxicology study toxic substances which are found in our personal, occupational, community, and global environments. What these substances are, where they are distributed and what happens to them, how they work, and locating and analyzing these substances are the central focus of study. A special concern is with human-made toxicants such as pesticides industrial chemicals, food
additives, and environmental pollutants; but toxic substances also occur naturally in the environment and include heavy metals and toxins produced by animals, plants, fungi, and bacteria. The Program. The study of environmental toxicology draws heavily from preparatory courses in biology, chemistry, mathematics, and physics. The major offers courses outlining the chemical, biological, and legal aspects of environmental toxicology (legislation concerning pollution, pesticides, food additives, and consumer protection) as well as providing in-depth treatment of different groups of toxic substances. Students can specialize in areas of environmental toxicology—for example chemical analysis, environmental monitoring, animal toxicology, or environmental health and safety—by choosing electives in the major. Internships and Career Alternatives. Research positions in both university and private laboratories, as well as with governmental regulatory agencies in nearby Sacramento, are examples of current internship openings for environmental toxicology majors. Approximately half of the undergraduates completing the environmental toxicology program elect to go on for advanced degrees in toxicology, pharmacology, biochemistry, and the medical sciences with the B.S. degree have found jobs with government agencies, universities, in industry, research, and consulting firms, and with laboratories. Those students who emphasize the physical sciences in their major usually qualify for positions in research analysis, environmental monitoring, and forensic toxicology. Those emphasizing the biological sciences would qualify for similar positions in animal toxicology, environmental health and safety, and pest control.

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 advisor's approval. Courses shown without parentheses are required.)

English Composition Requirement

Preparatory Subject Matter: 1-17

Biological sciences (Biological Sciences 1A, 1B, 1C, 15)

Chemistry (Chemistry 2A-2B-2C, or 2A-2B+C+2CH and 118B-118B-118C or 128A-128B-128C)...

Computer science [Agricultural Science and Management 21]...

Environmental sciences (Environmental Toxicology 10 or Environmental Studies 10)...

Mathematics (Mathematics 18A-18B or 21A-21B)...

Physics (Physics 1A-1B or 5A-5B)...

Statistics (Statistics 13 or 10)...

Breath/General Education Requirement

Satisfaction of the General Education requirement to include courses selected with advisor's approval to complement the major (courses in cultural economics, environmental studies, political science, psychology, and sociology are particularly recommended.)...

Additional breadth in humanities and social sciences...

Depth Subject Matter: 29

Biochemistry (Biological Sciences 102, 103)...


Restricted/Other Electives

Electives selected for area of specialization with advisor's approval

Unrestricted Electives...

Total Units for the Degree...

Major Adviser: R.H. Rice

Advising Center for the major is in 4111 Meyer Hall (916-752-1042)

Minor Program Requirements:

UNITS

Environmental Toxicology 18

Elective courses 6

Elective courses 12

Elective units minimum, selected from Environmental Toxicology 10, 128, 130A-E, 131, 132, 135, 138, 139, and 199 (4 units combined maximum)...

Minor Adviser: M.G. Miller

Related Courses: See Atmospheric Science 149A, Resource Sciences 131, Environmental Studies 10, 121, 126, Wildlife and Fisheries Biology 153, Water Science 41

Graduate Study: Programs of study leading to M.S. and Ph.D. degrees are available in the areas of Pharmacology and Toxicology, Ecology, and Agricultural and Environmental Chemistry. For information, contact the Advising Office or the appropriate graduate advisor. Refer also to the Graduate Studies section in this catalog.

Graduate Advisers: B.W. Wilson (Pharmacology and Toxicology), T. Shimbamoto and P.H. Hsieh (Agricultural and Environmental Chemistry)

Courses in Environmental Toxicology (ETX)

Lower Division Courses

10. Introduction to Toxicology (3) III. Hsieh

Lecture—3 hours. Prerequisite: open to science and non-science majors. Study of some natural and man-made toxic substances, including 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.

92. Internship (1-2) 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 (1-6) I, II, III. The Staff (Chairperson) and Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

101. Principles of Environmental Toxicology (3) I. Matsumura

Lecture—3 hours. Prerequisite: Chemistry 8B, 128B, or the equivalent; Biological Sciences 102 recommended. 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.

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 accretion; sources and occurrence of major classes of environmental toxicants.

112B. Toxicants in the Environment (4) III. Shimbamoto

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5; 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.

114A. Biological Effects of Toxicants (3) II. Rice

Lecture—3 hours. Prerequisite: Biological Sciences 103 (may be taken concurrently); course 101 and Physiology 110 recommended. Course designed to illustrate the biological effects of toxic substances in living organisms. Topics to be covered include structure and mechanism-of-action of representative toxins, types of effects, symptoms, and antidotes.

114B. Biological Effects of Toxicants: Comparative Aspects (4) II. Miller

Lecture—1 hour; laboratory—2 hours; laboratory—3 hours. Prerequisite: course 114A and consent of instructor. Course designed to illustrate basic principles of toxicology and to acquaint 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.

126. Food Toxicology (3) III. Shimbamoto, Gruenewald (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, environmental and industrial additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.)

130A-E. Selected Topics in Environmental Toxicology (3) I, II, III. The Staff (Chairperson in charge)

Lecture/Discussion—4 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 those areas as the microbiology of toxic substances, poisons, plants and animals, chemical ecology, toxic substances in food, and the safe handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (5) III. Hsieh, Last (Internal Medicine in charge)

Lecture—4 hours; laboratory—6 hours; lecture—6 hours; slide demonstrations and extensive library assignments. 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 hazards, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants. Offered in alternate years.

132. Chromatography for Analytical Toxicology (4) II. The Staff (Chirpereon in charge)

Lecture—1 hour; laboratory—6 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 separation 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. Hsieh

Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Environmental health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals.

138. Legal Aspects of Environmental Toxicology (3) I, 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.

190. Seminar (I) I. 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 institutional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature readings, and career opportunities. (P/NP grading only.)
Epidemiology (A Graduate Group)

Tim E. Carpenter, Ph.D., Chairperson of the Group
Group Office: 110 Surve IV (Department of Epidemiology and Preventive Medicine, 916-752-9174)

Faculty
Includes members from the Department of Epidemiology and Preventive Medicine, Division of Occupational and Environmental Medicine, and other related departments in the Schools of Medicine, Veterinary Medicine, Graduate School of Management, and the Colleges of Agricultural and Environmental Sciences and Letters and Science.

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include: environmental occupational epidemiology, infectious disease epidemiology, epidemiologic methods, health services and economics, and metabolic, nutritional, and chronic disease epidemiology. For detailed information regarding the program, address the chairperson of the group.

Graduate Advisers: M. Thurmon (Department of Epidemiology and Preventive Medicine, 752-9087), J. Beaumont (Occupational and Environmental Medicine, 752-9087).

Related Courses. For additional course work in Epidemiology, please see Epidemiology and Preventive Medicine and Internal Medicine—Occupational and Environmental Health.

Courses in Epidemiology (EPI)

223. Spatial Epidemiology (3) II. Carpenter Lecture—2 hours; laboratory—3 hours. Prerequisite: Epidemiology and Preventive 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.

250. Introduction to Clinical Research Design and Epidemiology (3) I. McCurdy, Hirsh Lecture—1 hour; discussion—2 hours. Prerequisites: graduate standing and introductory statistics at undergraduate or graduate level. Students will learn basic clinical research design by preparing an original research proposal in parallel with lectures and readings. Small discussion groups organized by field of interest will allow students to receive constructive feedback on their proposals. (SU grading only.)

251. Environmental Epidemiology (3) II. Beaumont. Lecture—3 hours. Prerequisite: Epidemiology and Preventive 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 communicable, occupational, and personal exposure to toxic substances. Offered in alternate years.

270. Research Methods in Occupational Epidemiology (3) II. Beaumont. Laboratory—3 hours. Prerequisite: Environmental Studies 126 or Epidemiology and Preventive Medicine 405, and Statistics 102 or Epidemiology and Preventive Medicine 402. Methods used in epidemiology 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.

271. Epidemiology of Diseases and Injuries in Agriculture (3) III. Beaumont. Lecture—discourse—3 hours. Prerequisite: Environmental Studies 126 or Epidemiology and Preventive Medicine 405, or consent of instructor. Overview of disease and injury hazards in agriculture with emphasis on epidemiologic studies. Topics include respiratory diseases, zoonotic diseases, and other disease groups. Offered in alternate years.

290. Seminars in Epidemiology (1) I, II, III. Seminar—1 hour. Students will actively participate in the presentation and discussion of ongoing or published research projects in epidemiology. (SU grading only.)

298. Group Study (1-5) I, II, III. Group study in selected areas of epidemiology.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

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.

287. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored in. Tutoring in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicity 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/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses
203. Environmental Toxicants (4) II. Crosby. Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C or the equivalent, or Chemistry 88B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions leading to detection, toxicity, fate, and ecological importance. Offered in alternate years.

214. Mechanisms of Toxic Action (3) III. Hammond, 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. The Staff. Lecture—3 hours. Prerequisite: course 101 and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

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 the analysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) I. Reece, 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 fragmentation and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students.

234. Neuropharmacological Basis of Neurotoxicology (3) I. Wigoder. Lecture—3 hours. Prerequisite: Physiology 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 Physiology 234.)

240. Ecotoxicology (3) III. Matsumura Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology, or consent of instructor. Principles of toxicology as applied to
Courses in Epidemiology and Preventive Medicine (EPM)

Upper Division Courses

104. History of Veterinary Medicine (3) III. Lecture—2 hours; discussion—1 hour. Veterinary medicine's role (from man's first domestication of ani-
mal to the decline of home) in building a foundation for rational healing; and its contributions during the eighteenth-twentieth centuries to the creation of mod-
ern medicine.

106. Human-Animal Interactions: Benefits and Issues (2) II. Har.
Lecture—2 hours. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthro-
polologic, developmental, human health, and therapeutic perspectives, as well as effects of humans on animals.

111. Animal Hygiene (3) II. McCapes
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Causes, prevention, and control of animal diseases important in economic agri-
culture and in public health, with emphasis upon animal management factors in disease.

150. Food-Borne Infections and Intoxications (4) III. Geoghege, Riem. 
Lecture—4 hours. Prerequisite: Food Science and Technology 104, Veterinary Microbiology and Im-
munology 127. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and dis-
tribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

199. Special Study for Advanced Undergraduates (1-2) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

202. Sampling in Health-Related Research (3). Farver
Lecture—3 hours. Prerequisite: course 403 or the equivalent; consent of instructor. A thorough cover-
age of simple random sampling, stratified sampling, cluster sampling, systematic sampling, and sequen-
tial sampling. Emphasis is on application of the sam-
ping concepts in alternate years.

203. Multivariate Biostatistics (3) I. Farver
Lecture—3 hours. Prerequisite: courses 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analy-
sis, factor analysis, Two-group and k-group multivari-
ate analysis, multiple regression, Two-group and k-
group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years.

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. Epi-
demiological, biological, and ecological features of some major infections shared by man and 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.

214. Immunodiagnostic Techniques (3) II. Lam, C. w
Lecture—3 hours. Prerequisite: enrollment in MPVM program or consent of instructor. Consideration of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple, and inexpensive procedures for mass screening.

216. Immunodiagnostic Techniques Laboratory (2) II. Lam
Discussion—1 hour; laboratory—2 hours. Prerequi-
site: course 216 may be taken concurrently or con-
sent of instructor. Application and interpretation of serologic techniques for diagnosis of animal dis-

eases. (SIU grading only.)

217. Evaluation of Diagnostic Tests (2) II. Gardner
Lecture/discussion—1.7 hours; laboratory—1 hour. Prerequisite: consent of instructor. Topics include sensitivity, specificity, predictive values, Bayes’ The-

orem, ROC curves, and statistical agreements between tests, series and parallel testing strategies. Emphasis on rational interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.

218. Mycoplasmas as Agents of Disease (2) III. Lam
Lecture—2 hours. Prerequisite: Veterinary Microbiology and Immunology 127 or the equivalent or consent of instructor. Offered in alternate years.

220. Advanced Avian Medicine (3) III. Lam, Waken.
Lec
ture—3 hours. Instruction on the methods of preven-
tion of the major diseases of domestic poultry.

222. Epidemiological Modeling (3) III. Carpenter
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 405. Techniques of model-
building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, con-
struction, and validation will be emphasized.

225. Preventive Avian Medical Practice (3) II. The Staff (Chairperson in charge)
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 pre-
vention and eradication programs pertaining to dis-

eases of economic importance will be discussed.

258. Public Health Aspects of Meat and Meat Products Technology (3) III. Geoghege
Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

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.

Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpr-
etation.

291. Seminars in Epidemiology (1) III. Seminar—1 hour. Participants will present and dis-

cuss ongoing or published research projects in epi-
demiology. Emphasis will be on study design and data analysis. (SIU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SIU grading only.)

Professional Courses

400. Orientation to Statistics (4) I.
Lecture—40 hours total. Prerequisite: enrollment in MPVM degree program. Introduction and overview to the concepts basic to biostatistics and epidemiology. (SIU grading only.)

401. Biomedical Information Resources and Retrieval (3) I. Borkman
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: enrollment in MPVM Program or consent of instructor. Introduction to the skills and tools needed to find information in the biomedical sci-
ences with an emphasis on veterinary medicine. Emphasis will be placed on selection of appropriate sources to solve a particular information need using both print and electronic reference and bibliographic sources.

402. Medical Statistics I (4) I, II.
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 401. Continuation of course 402. Analysis of variance in biomedical sciences; non-
parametric methods; multiple regression; biomedical applications of statistical methods.

404. Medical Statistics II (4) III.
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 403. Continuation of course 403. Analysis of covariance, variable selection, analysis of mutivariate frequency tables; logistic regression; discrim-

criminant analysis; time dependent variation and trends; biometrical applications.

405. Principles of Epidemiology (5).
Lecture—5 hours; discussion—2 hours. Prerequisite: a degree in veterinary medicine, medicine, or dent-
tistry, or consent of instructor. Approved for graduate degree credit. Combination of lectures, class discus-
sions, and problem solving. Topics are methods of inves-
tigating disease outbreaks, quantifying disease in popula-
tions, medical ecology survey methods, an introduction to epidemiologic study design and ani-
mal disease surveillance.

406. Epidemiologic Study Design (3) III.
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: course 405 or the equivalent; course 403 or the equivalent (may be taken concurrently). Approved for graduate degree credit. Use of multiple regression, discriminant analysis, factor analysis, path analysis, and other multivariate techniques in epidemi-
ology. Approaches for handling the analysis of large data sets.

408. Research Methodology and Research Reports (3).
Lecture—1 hour; discussion—2 hours. Prerequisites: enrollment in MPVM degree program or consent of instructor. Approved for graduate degree credit. Application of the experimental method to solving some of the epidemiologic problems involving dis-
ease of animals. Students must identify and select a problem, and complete all work preparatory to the actual field collection of data or specimens.
Feminist Theory and Research

Linda Morris, Ph.D., Program Director
Program Office, 277 Kerr Hall (916-752-4609)

Graduate Studies: 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 ten participating departments (Anthropology, Comparative Literature, 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 additional graduate courses, 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 (916-752-4609).

Fermentation Science

(College of Agricultural and Environmental Sciences)

The Major Program

The Fermentation Science major is a program of study for the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad interdisciplinary/sd-related education is offered which may be combined with specializations in ecology (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, vitamins are other research 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, biochemistry, microbiology, 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-ecology, 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.)

English Composition Requirement..........................0-6
See College requirement

Preparatory Subject Matter: Biochemistry (Biological Sciences 102, 103)..........................6
Biological Sciences 1A..................................5
Chemistry (Chemistry 2A-2B-2C, and 8A-8B or 128A-128B, 129A)..........................21-25
Computer science (Agricultural Science and Management 21, Computer Science Engineering 10, 30, or Engineering 5)..........................3-4
Mathematics (Mathematics 16A-16B or 21A-21B)..........................8-12
Microbiology (Microbiology 102-102L)..........................6
Physics (Physics 5A, or 5B or 5C)..........................6
Statistics, including analysis of variance (Agricultural Science and Management 150 or Statistics 106)..........................4

Breadth/General Education..........................24
Satisfaction of General Education requirement (in "Civilization and Culture" and/or "Contemporary Societies") plus additional coursework in social sciences and humanities or others as approved by adviser to total 24 units.

Depth Subject Matter: Choose from:

Chemistry 107A, 107B, 108, 130
Chemical Engineering 161, 208
Epidemiology and Preventive Medicine 150 (or Food Science and Technology 104)
Biological Sciences 101
Microbiology 103A, 103B, 130L, 250
Viticulture and Enology 3, 123, 124, 125, 126, 127, 128, 135, 140, 166, 219, 236 (no variable-unit 190, 192, 198, 298 courses allowed toward depth requirement)

(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)

Restricted Electives: 0-28

Selected according to student's educational goals and upon approval by adviser.

Restricted Units: 0-14

Total Units for the Degree: 180

Major Adviser: A.C. Noble.

Graduate Study: Refer to the Graduate Studies degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, Microbiology.

Course not offered this academic year.
Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

Faculty
See 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 are required to take a common core of coursework 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, the student is expected to 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

English Composition Requirement.................7-12
See College requirement

Rhetoric

1

Additional English (104).........................3

Preparatory Subject Matter........................51-54
Chemistry (Chemistry 2A-2B-2C)..................15
Computer science (Computer Science Engineering 10)..................8
Mathematics (Mathematics 16A, 16B, 16C or 21A, 21B, 21C).............9-12
Physics (Physics 9A, 9B, 5C or 9A, 9B, 9C).................12
Statistics (Statistics 12 or Agricultural Science and Management 150)...........4
Textiles and clothing (Textiles and Clothing 6 and 8 or Engineering 45)...........8

Breadth/General Education..........................6-24
Satisfaction of General Education requirement; See advising office for breadth requirement.

Depth Subject Matter................................37
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

Restricted Electives..................................30
Select courses from the following: Computer Science and Mathematics: Agricultural Science and Management 21; Engineering 5; Applied Science Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B

Chemistry:
Chemistry 108, 111, 115, 120, 121, 124A, 124B, 124C, 130, 131, 140

Marketing/Management:
Agricultural Economics 100A, 100B, 113, 136, 157; Economics 1A, 1B, Statistics 103

Material and Advanced Fiber/Polymer Science:
Aeronautical Science Engineering 137; Engineering 104A, 104B, Textiles and Clothing 250A-F, 290, 293

Textiles:
Textiles and Clothing 162, 162L, 164, 165, 171, 173, 174

Unrestricted Electives.........................28-41
Total Units for the Degree.........................180

Major Adviser. Y.L. Hsieh (Textiles and Clothing).
Advising Center for the major is located in 129 Eversen Hall (916-752-4417).

Minor Program Requirements:

UNITS

Fiber and Polymer Science........................18
Textiles and Clothing 6 or Engineering 45....4

Courses in Fiber and Polymer Science (FPS)

Upper Division Courses
100. Principles of Polymer Materials Science (3) II. Zeronian
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 Engineering Sciences Materials Science 147.)

110. Plastics in Society and the Environment (4) III. Needles
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. Application to societal needs, and their impact on society and the environment. General Education credit: Nature and Environment.

150. Polymer Syntheses and Reactions (3) III. Zeronian
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. Zeronian
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 deterrents.

161L. Textile Chemical Analysis Laboratory (1) I. Zeronian
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.

*Course not offered this academic year.

Fisheries
See Animal Science; and Wildlife and Fisheries 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 affect 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 major 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, 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 parenthesis are required.)

UNITS

English Composition Requirement..................0-8
See College English requirement

Preparatory Subject Matter.........................74-78
Mathematics (Mathematics 16A-16B-16C or 21A-21B-21C)..................9-12
Microbiology (Microbiology 102, 102L).............6
Physics (Physics 5A-5B or 89-9A-9C)..................12
Other (one course from Computer Science Engineering 10, 30, Engineering 5, Mathematics 22A, 22B, 22C, Statistics 13, Agricultural Science and Management 150)..................3-4

Breadth/General Education.........................24
Satisfaction of General Education requirement

Depth Subject Matter...............................30
Food Science and Technology (to include Food Science and Technology 103, 104, 104L, 110A or 111).................25
Biochemistry (Biochemistry 123, 123L)..............5
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 specialize in 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 course offerings 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 and for three programs also 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 major may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

Five career-oriented options are available in the major in Food Science. Each 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.

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 in small food companies, in small consulting firms, or in professional (medical, veterinary, or dental) school. The Food Biology/Microbiology option prepares students for graduate study and research in areas including food science, biochemistry, biotechnology, microbiology, and post-harvest biology. The Food Chemistry option prepares students for graduate study and research in such areas as flavor chemistry, food additives, chemistry, biotechnology, biochemistry and toxicology.

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 advisor's approval. Courses shown without parentheses are required for all options.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>3-11</td>
</tr>
<tr>
<td>See College requirement</td>
<td>0-8</td>
</tr>
<tr>
<td>Additional English (English 102 with science or related area, or English 104)</td>
<td>3</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>26-32</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1A)</td>
<td>6</td>
</tr>
<tr>
<td>General chemistry (Chemistry 2A-2BAC)</td>
<td>15</td>
</tr>
<tr>
<td>Organic chemistry (see option for requirement)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A-16B)</td>
<td>6</td>
</tr>
<tr>
<td>Physics (see option for requirement)</td>
<td>6</td>
</tr>
<tr>
<td>Food science seminar (Food Science and Technology 103A)</td>
<td>3</td>
</tr>
<tr>
<td>Food composition (Food Science and Technology 100A)</td>
<td>3</td>
</tr>
<tr>
<td>Food composition laboratory (Food Science and Technology 101A)</td>
<td>2</td>
</tr>
<tr>
<td>Food properties (Food Science and Technology 100B)</td>
<td>3</td>
</tr>
<tr>
<td>Food biochemistry (Food Science and Technology 100C)</td>
<td>3</td>
</tr>
<tr>
<td>Food microbiology (Food Science and Technology 104)</td>
<td>3</td>
</tr>
<tr>
<td>Food science seminar (Food Science and Technology 105A)</td>
<td>3</td>
</tr>
<tr>
<td>Nutrition (see option for requirements)</td>
<td>2-5</td>
</tr>
<tr>
<td>Statistics (Agricultural Science and Management 190)</td>
<td>4</td>
</tr>
<tr>
<td>Internship (Food Science and Technology 192)</td>
<td>3</td>
</tr>
<tr>
<td>Special study (Food Science and Technology 199)</td>
<td>3</td>
</tr>
</tbody>
</table>

Breadth/General Education
Satisfaction of General Education requirements plus social science and humanities electives to total 24 units.

Food Technology Option
Specific course requirements: 57-58

Food Technology Option
Specific course requirements: 57-58

Food Business and Management Option
Specific course requirements: 59-60

Consumer Food Science Option
Specific course requirements: 45-46

Food Biology/Microbiology Option
Specific course requirements: 53-59

Additional courses to be selected from a master list available from the department Advising Center.

*Course not offered this academic year.
Food Science and Technology

(A Graduate Group)

Charles F. Shoemaker, Ph.D., Chairperson of the Group
Group Office, 109 Food Science and Technology Bldg. (916-752-1415)

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 study stresses 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 sciences, and onology. Individually designed programs are also acceptable. For the Ph.D. there are three areas of specialization: biochemistry, chemistry, and microbiology. Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the Graduate Announcement.

Graduate Advisers

Contact Graduate Studies for the list of advisers.

Food Science and Technology

(College of Agricultural and Environmental Sciences)
Erika L. Barrett, Ph.D., Chairperson of the Department
Department Office, 126 Creus Hall (916-752-1485)

2. Introductory Food Science (3) III. Lewis Lecture—3 hours; one industrial visit to a food factory (optional). Processes by which agricultural commodities are preserved and converted into edible foods; regulation of food manufacture and the chemistry and microbiology of food that control its quality and safety. Not open to students who have received credit for any other Food Science and Technology course. General Education credit: Nature and Environment.

49. Processing Plant Studies (1) III. M. McCarthy Discussion—1 hour; field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

50. Introduction to Food Science and Technology (3) III. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, Biological Sciences 1A. Introduction to fruit, vegetable, dairy, seafood and meat technology. Overview of food processes used for preservation of food quality. Pilot plant exercises include food processing operations such as cheese making, canning, freezing, fermentation and dehydration of foods.

93. Public Issues in Nutrition and Food Science (1) II. Schneeman Seminar—1 hour; Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to nutrition and food science for students new to the campus. (F|NP grading only.) Same course as Nutrition 123.

99. Special Study for Undergraduates (1-5) I, II. The Staff (Mason in charge) (F|NP grading only.)

Upper Division Courses

100A. Principles of Food Composition and Properties (3) I. Shoemaker Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

100B. Principles of Food Composition and Properties (3) II. Russell, Schneeman Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

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 tissue. Importance of enzymes in food quality and their use in food processing aids. Application of recombinant DNA technology to improving food quality.

101A. Principles of Food Composition and Properties Laboratory (2) I. Shoemaker Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100A (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100A.

101B. Principles of Food Composition and Properties Laboratory (2) II. Mazella Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100B.

102A. Matting and Brewing Science (4) I. Lewis Lecture—4 hours. Prerequisite: Biological Sciences 102, 103; senior standing recommended. The technology of the matting, 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 Food Science and Technology 102.

Courses in Food Science and Technology (FST)

Lower Division Courses

1. Food Science and Society (3) The Staff Lecture—2 hours. Discussion—1 hour. Nature and scope of world food problem; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement of food acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B, or 111.

*Course not offered this academic year.
102B. Practical Malting and Brewing (4) II. Lewis Lecture/discussion—2 hours, laboratory—6 hours. prerequisite: course 102A. Laboratory, 20A and analytical experience beyond Chemistry 2C, such as Viticulture and Enology 123, Food Science and Technology 103, Biochemistry and Biophysics 101L or 123L. 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 through analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing.

102C. Advanced Malting and Brewing (4) III. Lewis Lecture/discussion—2 hours; laboratory—6 hours. Prerequisite: course 102B. Expands knowledge of malting and brewing processes by applying analytical methods of brewing science to experiments and exercises with brewing materials and by pilot scale brewing designed to illustrate the bases for understanding this complex technology.

102D. Malting and Brewing Colloquium (2-4) III, IV. The Staff Lecture/discussion—2 hours; term paper. Prerequisite: fall quarter—courses 102A, 110A; winter and spring quarters—courses 102B, 110B. Open to seniors in Fermentation Science and Food Science and Technology only. To provide detailed interpretation and extended discussion of issues in brewing science relevant to professionals in the industry and to give frequent practice with written essays and calculations based on the examinations of the Institute of Brewing. May be repeated for credit.

103. Physical and Chemical Methods for Food Analysis (3) I. Groenenwelt, G. Smith, Tappel Lecture—4 hours. Laboratory—5 hours. Prerequisite: Chemistry 5, 8B; Biological Sciences 103 (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for determining properties of foods. Modern instrumental and statistical analysis techniques are stressed.

104. Food Microbiology (3) II. Barrett 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. Detection of microbes in foods as a resource for food scientists.

104L. Food Microbiology Laboratory (4) III, IV. C. Price, Shutler Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A or 102; course 104. Fundamental characteristics of microorganisms involved in food spoilage, in foodborne disease, and food fermentation. Analysis of microbiological quality of foods.

107. Principles of Sensory Analysis of Foods (4) II. The Staff Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Science and Management 150 or the equivalent course in statistics. Nature of sensory responses with emphasis on aroma, taste, and texture of foods; critical use of analytical laboratory methods; relation of sensory data to chemical and instrumental measurements; collection and statistical analysis and interpretation of sensory data.

108. Food Processing Plant Sanitation (3) II. York Lecture—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A. Discussion of factors relating to sanitation 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 pertinent laws and regulations controlling the agencies.

109. Principles of Quality Assurance in Food Processing (3) III. Reid Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Science and Management 150. Quality assurance measurement techniques applied to selected food processed products emphasizing rational for establishing valid quality assurance programs including selection of samples at critical points to ensure conformity to quality assurance programs used by the food industry.

110A. Physical Principles in Food Processing (3) I. Merson Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A or 5B 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—3 hours. Prerequisite: course 110A or the equivalent. Applications of the Energy Technology 110L recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation; heat transfer; microwave heating, refrigeration, freezing, pyrometrics; mass transfer during drying, and storage.

111. Introduction to Food Processing (4) II. M. McCarthy, Miller Lecture—3 hours; discussion—2 hours. Prerequisite: Biological Sciences 1A, Chemistry 5A-B, or the equivalent. Food processing from farm to package. Characteristics of raw materials, fresh produce handling, overview of food processing and processing unit operations, chemical additives. Demonstration and field trips.

117. The Senses, Sensory Measurement, Psychophysics, and Food (4) I. O'Mahony Lecture—4 hours. Prerequisite: Biological Sciences 1A; Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory receptor systems; psychological and physiological variables affecting sensory responses; general principles of sensory psychology; historical examination of modern psychophysical methods for the investigation of the mechanisms of human sensory systems. Problems of sensory measurement and their relation to food flavor.

119. Chemistry and Technology of Milk and Dairy Products (4) II. Rosenberg, Shoemaker, G. Smith Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 1A and 102, or consent of instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products.

120. Principles of Meat Science (3) III. Bandman, Lee (Animal Science) Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103 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.)

120L. Meat Science Laboratory (2) III. Lee (Animal Science), Bandman Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103; 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 muscle quality, chemical and sensory evaluations of meat, and field trips to packing plant and processing plant. (Same course as Animal Science 120L.)

122. Marine Food Science (3) I. 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 landings techniques as they influence quality processing, storage, and public health aspects of marine organisms; resource development, including aquaculture. Offered in alternate years.

125. Corrosion Principles in Food Processing Interactions (3) II. Gruenwedel Lecture—2 hours. Prerequisite: Mathematics 16B; Physics 5C; Chemistry 8B. Course presents thermodynamic and kinetic principles of container-product interactions (internal corrosion) and investigates these interactions affecting the wholesomeness of processed, canned foods.

128. Food Toxicology (3) III. Gruenwedel, Shimamoto (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.)

131. Food Packaging (3) III. Knochen Lecture—3 hours. Prerequisite: Chemistry 6B, Biological Sciences 1A, Physics 5B. Principles of food packaging. Familiarized students with functions, materials, properties, fabrication, applications and regulations of food packaging.

140. Food Laws and Regulation (3) I. LeSaux (Law) Lecture—3 hours. Prerequisite: upper division standing. Legal and scientific issues involved in the regulation of the nation's food supply and nutritional status. Philosophy underpinning the application of regulatory statutes. Sources of information necessary for communication with government on public food policy issues.

150. Thermal Processing of Foods (3) III. Merson Lecture—2 hours; discussion, demonstration, and problem workshops—2 hours. Prerequisite: courses 104 and 110B or the equivalent. Theory and practical considerations of thermal processes in food preservation, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

150L. Thermal Processing Laboratory (2) III. Merson Laboratory—6 hours. Prerequisite: courses 104 and 110B; course 150 (may be taken concurrently). Laboratory exercises and thermal processing related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal processing equipment for the development and testing of sterilization processes.

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.

156. Computer Interfacing for Laboratory and Process Control (4) II. Russell Lecture—3 hours; laboratory—3 hours. Prerequisite: computer instruction or equivalent. Principles of micro- and mini-computer use in measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

192. Project Conduct in Industry (2) II. Henderson Lecture—1 hour; discussion—1 hour. Prerequisite: background in the physical sciences. Planning, execution, and documentation of design, development, and research project activities in the industrial world using the physical sciences. The project experiences will be food oriented (harvesting, processing, packaging, consumption).
180. Food Processing (4) III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100B, 104, 100C. Recent advances in food processing are examined in terms of their effects on the various physical properties of the raw material. Pilot plant exercises will be employed to identify and illustrate common principles among apparently diverse processes.

190. Senior Seminar (1) I. Roed, 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) II, III. The Staff (Merson 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)

196. Methods of Fruit and Vegetable Analysis (2) III. The Staff
Lecture—10 hours total; laboratory—30 hours total. Prerequisites: Chemistry 2C, course 100B. Principles and laboratory methods for the color, texture, and flavor analysis of California fruits and vegetables used in food processing. Field during the first two weeks immediately following the last day of spring quarter; considered a spring course for registration.

198. Directed Group Study (1-5) I, II, III. The Staff (Merson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Merson in charge)
(P/NP grading only)

Graduate Courses

201. Food Chemistry and Biochemistry (3) I. Tappel, Benhard, Guenwede
Lecture—8 hours; Laboratory—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. Roed, Haard
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103, Chemistry 107B. Fundamental principles of chemical and physical changes in food are applied to studies of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other components during storage, heating, freezing, dehydration, and concentrating of food materials.

203. Food Processing (3) III. K. McCarthy

205. Advanced Food Microbiology (3) III. Barnett in charge
Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103. Food Science and Technology 104 or a course in microbiology. Principles of rapid 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 fermentation.

207. Advanced Sensory-Instrumental Analyses (3) III. Noble (Viticulture and Enology)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107D and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of results, laboratory, and chemical and instrumental components to perception of appearance, texture, flavor. Offered in alternate years.

210. Proteins: Functional Activities and Interactions (3) II. The Staff
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.

235. Mycology of Food and Food Products (3) II. Miller
Lecture—3 hours. Prerequisite: course 104 or consent of instructor. Morphology and physiology of fungi associated with food. Desirable activities of fungi: food fermentations, single-cell protein production, mushroom culture. Undesirable activities: preharvest and postharvest deterioration, food spoilage and preservation, toxification.

250. Chromatographic and Electrophoretic Methods (4) II. G. Smith, Bandman, German
Lecture—8 hours; discussion—1 hour. Prerequisite: Chemistry 1A-1B-1C, 1A-1B-1C, 1A-1B-1C, 1A-1B-1C, 1A-1B-1C. 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) I. G. Smith, Bandman, German
Lecture—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.

256. Computer Applications in Laboratory and Process Control (3) III. Russell
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 156 or consent of instructor. Use of microcomputer interfacing to laboratory instrumentation for analytical and process control applications. Study of methods of control systems and control systems including modern instrumentation and computer control applications. Data transmission as data transmission.

270. Critical Evaluation of Scientific Literature (1) II, III. Shuster, Price
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 topical area chosen by instructor. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit.

290. Seminar (1-12) I, II, III. Ogrydziak
Seminar—1 hour. (S/U grading only)

290C. Advanced Research Conference (1-12) I, II, III. The Staff (Merson in charge)
Discussion—1 hour. Prerequisite: standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Planning and development of research programs and proposals. Discussion led by individual major instructors for their research group. (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, 1151 Meyer Hall (916-752-2512).

**Upper Division Courses**

120. Principles of Quantity Food Production (3) II. Proprietor
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 storing, service, menu planning, merchandising, and safety.

120L. Quantity Food Production Laboratory (2) I, II. Proprietor
Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

121. Institutional Food Purchasing and Sanitation (3) I. Schramm
Lecture—1 hour; discussion—2 hours. Prerequisite: Biological Sciences 1A; course 120. Principles of quantity food purchasing and sanitation.

122. Food Service Systems Management (3) II. Proprietor
Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120L. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

123. Personnel Management (3) III. The Staff
Lecture—3 hours. Prerequisite: a basic course in general psychology. Major personnel management functions; legal constraints and requirements; procedures in solving personnel problems faced by supervisors.

122. 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)
French

(College of Letters and Science)

Manfred Kutsch, Ph.D., Chairperson of the Department
Department Office (French and Italian), 515 Sproul Hall (916-752-0830)

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Preparatory Subject Matter</th>
<th>French 1, 2, 3, 5 (or the equivalent)</th>
<th>French 21, 22, 23</th>
<th>Linguistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>French 100</th>
<th>French 101</th>
<th>French 104</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two additional upper division French literature courses</th>
<th>8</th>
</tr>
</thead>
</table>

| Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate adviser | 16      |

| Total Units for the Major | 63-80 |

Recommended:
- French 101, 102, 103, 104, 107, and 180 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: G. Herrman

Minor Program Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>French 100</th>
<th>French 101</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Two elective courses in French language, literature, or civilization to be chosen in consultation with undergraduate adviser | 8 |

<table>
<thead>
<tr>
<th>Prerequisite Credit</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honors Program</td>
<td>Candidates for high or highest honors in French must write a senior thesis under the direction of a major. For this purpose, no honors candidates must enroll in at least six units of French 194h distributed over two quarters. Normally, a student will undertake the honors program 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.</td>
</tr>
</tbody>
</table>

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 enrolling in a separate program by preparing a dissertation emphasizing either in either Critical Theory or Feminist Theory, 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. Manes-Maniouri (M.A., Ph.D. degrees—French Linguistics); M. Blanchard (Ph.D. degree—French Literature).
- Teaching Credential Subject Representative, J. Wagnon, See also under the Teacher Education Program.

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:
- French 1 (5) I, II, III. The Staff
- French 2 (5) I, II, III. The Staff
- French 3 (5) I, II, III. The Staff
- French 4 (5) I, II, III. The Staff
- French 5 (5) I, II, III. The Staff

Upper Division Courses:
- French 100 (Comprehensive in French) (4) I, II, III. The Staff
- French 200 (Comprehensive in French) (4) I, II, III. The Staff

*Course not offered this academic year.*
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 veneration.

102. Introduction to French Drama (4) I, II, III.

Abraham
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.

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.

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 translations using a variety of non-literary materials, illustrating different problems and styles of translation. On successful completion of the course, students may apply for an academic year as an AEP student in a Francophone country or who have completed course 138.

106. French in Business and the Professions (4) I. Herman
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.

107. Contemporary France (4) III.

Prager
Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to aspects of French culture and Institutions of the contemporary period such as art, architecture, music, literature. Provides a background in French contemporary history, sociology, and institutions.

110. Stylistics and Creative Composition (4) II.

Herr
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 Exercises de style. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry.

113. Masterpieces of French Drama in Translation (3) III.

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 non-major. General Education credit: Civilization and Culture.

114. 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 non-major. General Education credit: Civilization and Culture.

115. 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 atomism, classicism, liberalism, naturalism, existentialism, absurdism, literary techniques and styles analyzed. General Education credit: Civilization and Culture.

116. The French Renaissance (4) III.

Van 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 repre-

sentation in such literary works as La Chanson de Roland, Courtly love lyric, the Arthurian romances of Chrétien de Troyes, Aquasmin and Nicolo, selected fabulae and fabulas. Offered in alternate years.

117. The French Renaissance (4) III.

Van 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 Babelon, Morn, Randard, Du Bellay, Labe, Marguerite de Navarre, Montaigne, and D'Aubigné. May be repeated once for credit when topic differs. Offered in alternate years.

117A. Baroque and Classicism (4) II.

Abraham
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The literature and intellectual culture of the period between the Renaissance and the French classicism. Offered in alternate years.

117B. The Classical Moment (4) III.

Abraham
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.

118A. The Age of Reason and Revolution (4) II.

Kusch
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 lai du siecle, Romantic irony, the creative imagination, the cult of ruin. Offered in alternate years.

118B. Realism, History and the Novel (4) III.

Appert
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. History of the French novel from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th and 19th centuries. Offered in alternate years.

119. From Baudelaire to Surrealism (4)

Appert, Hanonnex
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 lai du siecle, Romantic irony, the creative imagination, the cult of ruin. Offered in alternate years.

120. Twentieth Century French Novel (4)

Prager
Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Novels and theories of the novel, from Proust to the Nouveau and beyond. Readings from among Guiraud, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarrute, Simon, Barthes, Duras, Tournier, Perez, Modiano, Guibert, Touchaus. Offered in alternate years.

124. Post-Colonialist and Francophone Literature (4)

Appert, Prager
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Introduction to Post-Independent 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 postcolonialism. May be repeated once for credit when topic differs. Offered in alternate years.

125. French Literature and Other Arts (4)

Hanonnex
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.

127. Paris: Modernity and Metropolitan Culture (4)

Hanonnex, Appert
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 of art and modernity. Offered in alternate years.

133. From Page to Stage: Theatre and Theatricality (4)

Abraham
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.

135. Gender and Politics in French Literature and Culture (4)

Appert
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.

138. Advanced Literary Translation (4)

Bloom
Lecture—3 hours; numerous short in-class translations; frequent supplementary outside assignments. Prerequisite: course 100 or the equivalent (such as one academic year as an AEP 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 the selected topic or consent of instructor. Concentrated study of works of a single writer, judges 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. Offered in alternate years.

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. Offered in alternate years.

150. Topics in French Morphosemantics (4)

Marie-Masouli
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.
to the most recent developments in the field (i.e., case grammars, generative semantics, trace theory).

251. Trends in French Contemporary Linguistics (4) I. Mano-Manoiliu Seminar—3 hours; term paper. Prerequisite: course 250A 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.

251. Current Issues in Modern French Syntax (4) I. Mano- Manoiliu Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Explorations of various less regular phenomena, with reference to ongoing changes in modern spoken French.

250. Research Methods (2) I. Abraham Prerequisite—2 hours. Prerequisite: graduate student standing. Required of all graduate students in French. Introduces students to tools of research and to the various critical methods. (SU grading only.)

297. Individual Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1-5 hours. May be repeated for credit if different topics are studied.

260A. Nineteenth-Century Literature: Fiction (4) I. Hannock 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.

260B. Nineteenth-Century Literature: Poetry (4) I, II. Blanchard 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.

270A. Eighteenth-Century Literature: Philosophes (4) II. Kuech Seminar—3 hours; term paper and/or exposure. 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 when different topics are studied.

270B. 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.

197T. Tutoring In the Community (2-4) I, II, III. Kaufman 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. (PINP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

200. Literary Analysis (2) I. Blanchard Proseminar—1 1/2 hours; short papers. Prerequisite: graduate standing. Required of all graduate students in French. This proseminal is designed to acquaint stu- dents with basic principles of applied literary theory.

201. History of French: Phonology and Morphosyntax (4) III. Mano- Manoiliu Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 293A, or consent of instructor. Presentation of the main changes in the phonemic and grammatical structures of French, from Latin to contemporary spoken aspects.

205A. Sixteenth-Century Literature: The Humanists (4) I. The Staff Seminar—3 hours. French humanism in its most var- ied 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. Abraham Seminar—3 hours. Works of Corneille, Racine, Molèire, and minor dramatists. One or more authors may be covered. May be repeated for credit with con- sent of instructor when different topics are studied.

206B. Seventeenth-Century Literature: Prose (4) I. The Staff Seminar—3 hours; term paper and/or exposure. 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 dif- ferent topics are studied from quarter to quarter.

206C. Seventeenth-Century Literature: Poetry (4) III. Abraham Seminar—3 hours; term paper and/or exposure. 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: Philosophes (4) II. Kuech Seminar—3 hours; term paper and/or exposure. 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 when different topics are studied.

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. Hannock 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. Blanchard 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: Theater (4) II. The Staff Seminar—3 hours; term paper and/or exposure. Study of the works of one or several writers of the period.

209B. Twentieth-Century: Theater (4) II. Cohn Seminar—3 hours; term paper and/or exposure. 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. The Staff Seminar—3 hours; term paper and/or exposure. 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. Prager 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) II. 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. Bloomberg 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: Morphemics (4) I. Mano- Manoiliu Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on morphemics, i.e., a semantic analysis of grammatical categories, as well as of their paradigmatic and syntactic relations.

250B. French Linguistics: Transformational Syntax (4) I. Mano- Manoiliu Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectification, pas sivization, relativization) focusing

Freshman Seminar Program

Francisco J. Samaniego, Ph.D., Program Director
Program Office. 17 Wellman (Teaching Resources Center) (916-752-6050)

Committee in Charge
Stephanie Beardsley, Ph.D. (Residence Life)
George H. Cardinet, III, D.V.M., Ph.D. (School of Veterinary Medicine)

*Course not offered this academic year.
295. Seminar in Molecular Genetics (1-3) I. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Current topics in molecular genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal, and populational genetics to address questions in plant biology will be examined. (SU grading only.)

296. 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. (SU grading only.)

299. Research (1-12) I, II, III. Members of the Group (Chairperson in charge)
(SU grading only.)

Geography

(College of Letters and Science)
Jack D. Ives, Ph.D., Chairperson of the Department
Department Office, 2201 Hart Hall (916-752-0790, or 752-0792)

Faculty
Nicholas J. R. Allan, Ph.D., Associate Professor
Conrad J. Bahre, Ph.D., Professor
Dennis J. Dingemans, Ph.D., Associate Professor,
Academic Senate Distinguished Teaching Award
Deborah L. Elliott-Eskil, Ph.D., Associate Professor
Louis E. Grivet, Ph.D., Professor. (Geography, Nutrition)
Jack D. Ives, Ph.D., Professor
Stephen C. Jett, Ph.D., Professor
Janet D. Moseman, Ph.D., Professor
Mary L. Shelton, Ph.D., Professor
Emeriti Faculty
Howard F. Gregor, Ph.D., Professor Emeritus
Frederick J. Simons, Ph.D., Professor Emeritus
Kenneth Thompson, Ph.D., Professor Emeritus

The Major Program
Geography is a multiaffiliated discipline defined by its concern with place. Geographers strive to answer spatial questions regarding the earth's surface and the adjacent atmosphere and to describe and explain the character of regions; to ascertain the ways in which humans, historical and contemporary, have used and shaped the earth's surface; and to understand the physical, biotic, and human systems of our global environment and their interactions.

The Program. Both Bachelor of Arts and Bachelor of Science degrees are offered in geography. A.B. students choose one of five possible emphases: 1) general geography, encompassing the whole spectrum of the field; 2) cultural/historical geography, which stresses traditional human uses of the earth and the search for explanations of the different customs, beliefs, and lifeways characteristic of different parts of the world; 3) economic urban geography, which focuses on the locational factors affecting contemporary agricultural, industrial, and commercial activities, as well as on the characteristics and problems of urban centers; 4) physical geography, whose concern is the natural world, including climate, vegetation types, and the many physical features of the land's surface; and 5) regional characteristic and analysis, which emphasizes how geographic principles are applicable to contemporary urban and environmental concerns. These areas of emphasis will be closely integrated into the department's new specialization in mountain geography. The B.S. program emph-
izes physical geography courses with training in other physical and biological sciences and mathematics. A geography minor is also available.

**Career Alternatives.** The study of geography provides background for students interested in careers in education, business, industry, and government. In business and industry, opportunities for employment include positions in locational analysis, international trade, environmental consulting, transportation planning, remote sensing, environmental-impact analysis, market planning, and aerial photo interpretation. Local and state governments offer opportunities for employment in city, state, and regional planning and environmental analysis, while various federal departments need regional analysts, cartographers, remote-sensing experts, climatologists, and conservationists.

**A.B. Major Requirements:**

**Preparatory Subject Matter**

- Geography 1, 2, and 3: 10 units

**Depth Subject Matter**

- Geography 155 or 156, 157, and one UCO regional course from Geography 121-127: 35-44 units

Choose one emphasis from the following five:

**Emphasis I (General)**

- Geography 170 or 171: 24-28 units

One course from each of the following three groups:

- Geography 170 or 171
- Geography 141 or 155
- Geography 108 or 115

Four additional upper division geography courses:

**Emphasis II (Cultural/Historical)**

- Geography 170 or 171, one course from 108, 115, 141, 155
- Four additional courses from Geography 110, 143, 172, 173, 175

**Emphasis III (Economic/Urban)**

- Geography 110, 141, 155, one course from 108, 115, 170, 171
- Three additional courses from Geography 104, 142, 143, 156, 160, 161, 162

**Emphasis IV (Physical)**

- Geography 3, 108, 110, 115, 162, 173
- One course from 141, 155, 170, 171
- One additional course from Geography 102, 112, 116, 117, 161

**Emphasis V (Regional Planning and Analysis)**

- Geography 155 or 156: 26-28 units
- Geography 155 or 156: 110; one additional course from 121-127; and one course from 142, 160, 161, 162, 170, 173
- Environmental Biology and Management 110: Environmental Biology and Management 134 or Environmental Studies 171
- Political Science 107 or Environmental Studies 161; one course from Economics 115a, Agricultural Economics 148, or Geology 134, 45-64 units

**Recommended:** Geography 4.

**B.S. Major Requirements:**

**Preparatory Subject Matter**

- Geography 1, 2, 3, and 5: 16 units
- Statistics 13 or the equivalent: 4 units
- Mathematics 16A, 16B, and 16C; or Mathematics 21A, 21B, and 21C: 9-12 units
- Computer Science Engineering 10 or 30: 3-4 units
- Chemistry 2A, 2B, 2C: 15 units
- Biological Sciences 1A: 5 units
- Biological Sciences 1B, or Biological Sciences 1C: or Geology 60, 60L, Physics 6A and 6B: 5-6 units

**Depth Subject Matter**


**Two courses from Geography 102, 110, 112, 116, 117, 162, 173: 7-8 units**

**One course from Geography 121-127: 3-4 units**

**Four additional upper division, letter-graded units in Geography: 4 units**

**Nine additional upper division units chosen in consultation with the undergraduate adviser: 9 units**

**Total Units for the Major: 40-46 units**

**Recommended Geography 4. Physics 8A, 8B and 8C; Chemistry 8A and 8B.**

**Addendum:** The B.S. major provides a wide diversity of possible themes, including geomorphology, climatology, zoo-geography, plant geography, nutritional geography, water-resource studies, and mathematical geography. An individual’s program may emphasize one or more of these themes, and is planned in consultation with the major adviser.

**Minor Program Requirements:**

Letters and Science students who do not major in Geography may satisfy the requirements for a minor in the field by successfully completing the minimum units as follows. When choices of individual courses are required, these must be made in consultation with the major adviser.

**Geography**

- 19-20 units

**Minor I (General)**

- Geography 151, plus one course from each of the following four groups:
  - Geography 108, 115, or 173
  - Geography 170 or 171
  - Geography 155, 160, or 161
  - Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

**Minor II (Cultural)**

- Geography 102, 108, 115, and 173, plus one course from 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

**Minor III (Cultural)**

- Geography 170, 171, and 173, plus one course from each of the following two groups:
  - Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127
  - Geography 143, 172, or 175

**Minor IV (Economic)**

- Geography 110 and 141, plus one course from each of the following three groups:
  - Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127
  - Geography 160, 161, 162, or 170
  - Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

**Minor V (Environmental Resource)**

- Geography 160, 161, 162, 173, and 175

**Minor VI (World Regional)**

- Geography 121, 122A or 122B, 123 or 124, 125A or 125B, 126 or 127

**Major Adviser:** See Class Schedule and Room Directory.

**Graduate Study:** The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

**Graduate Adviser:** See Class Schedule and Room Directory.

**Courses in Geography (GEO)**

**Lower Division Courses**

1. Physical Geography (4) I, IV; II. The Staff 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) I. Allan; II. The Staff 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 industrial world. General Education credit with concurrent enrollment in course 2G: Contemporary Societies.

3. Climate and Weather (4) I. Shelton; III. The Staff Lecture—3 hours; discussion—1 hour. Basic concepts of climate and weather; energy and moisture exchanges, atmospheric pressure, global circulation and winds; instruments for obtaining climatological data; weather maps; severe storms; global, regional, and local climate and weather; climatic change; climate of California.


5. Introduction to Urban and Economic Geography (3) I. Dingemans; II. Morsen Lecture—3 hours. The location of economic and urban activities. Patterns and theories of spatial organization, resource development, agriculture, natural and manufacturing regions, urban systems, and urban structure. General Education credit with concurrent enrollment in course 5G: Contemporary Societies.


6G. Economic and Urban Geography: Discussion (1) I. Dingemans; II. Morsen. Discussion—1 hour; short papers. Prerequisite: course 5 concurrently. Small group discussion of topics and readings assigned for course 5. Preparation and discussion of short papers. General Education credit with concurrent enrollment in course 5G: Contemporary Societies.

6. Human Impacts on the Landscape (4) I. The Staff Lecture—4 hours. Local and global effects, effects of time, spatial and human occupation, economics, and technological changes on wild and domesticated flora and fauna; soils; water; landforms; climate. Emphasis on landscape modification. Not intended for students planning to take course 161 or 170.

10. The World's Regions (3) I, IV; 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.

50. Geography and Environmental and Regional Planning (3) I. Dingemans Lecture—3 hours. Principles of spatial planning for regional change. Policies for environmental, economic, and social modifications. Illustrated case studies include: U.S. city planning, USSR industrial and population shifts, European regional plans, Chinese agricultural and environmental programs.

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.)

59. 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**

102. Field Course in Physical Geography (4) III. Elliot-Fish Lecture and field trip—normally one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic study of the physical environment in a single region.
104. Field Course in Urban Geography (4) III. Allan Lecture—1 hour; field trip. Field analysis of selected urban problems in California. Special attention to regional interrelationships, functional structure, and land-use changes as specifically related to the core of the city, changing residential and retail patterns, and urban encroachment on agricultural lands.

105. Cartography (4) II. The Staff Lecture—1 hour; laboratory—8 hours. Prerequisite: course 1 or consent of instructor. Basic cartography, principles of design, and generalization of base maps; symbolization and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing (3) III. Biersack Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic photogrammetry, sensors and platforms, aerial photo interpretation, and remote sensing applications.

107. Advanced Cartography (4) III. The Staff Lecture—1 hour; laboratory—8 hours. Prerequisite: course 105. Advanced principles and techniques of cartographic representation. Emphasis on cartography, plate-making, and color printing. Color separations, color separations, and color photography. Laboratory of current cartographic equipment, with emphasis on producing maps.

108. Analysis of Landforms (4) II. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landscape and geomorphic processes. Topics include structural geology, rock weathering, and soil genesis, hillside processes, and fluvial, glacial, and coastal landscapes.

109. Quantitative Spatial Analysis (4) I. Dingerman Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 5, and Statistics 13 or 102 recommended. Methods for geographic research and planning: quantification and analysis of spatial data patterns and trends; optimal location solution; includes regression, and use of pre-packaged computer programs.

110. Coastal Landforms and Landscapes (4) III. Elliott-Fisk Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. Examination of the landforms and processes, with emphasis on the coastal zone. Analysis of landforms and processes of the coastal environment.

111. Mesoclimatology (4) III. Shelton Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 or consent of instructor. Air masses and moisture exchanges at the earth-atmosphere interface; physical controls; spatial and temporal variations, and modeling of these processes. Review of pre-packaged programs.

112. Climate Change (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Understanding the processes of change, and the implications for human survival and sustainability.

125A. North Africa and the Middle East (4) III. Griessnig Lecture—4 hours. Prerequisite: courses 1 and 2, or consent of instructor. Geography of the historical and cultural regions of North Africa and the Middle East. Focus on the impact of cultural and historical processes on the region's development.

125B. Sub-Saharan Africa (3) II. The Staff Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Sub-Saharan Africa.

126. Southern Asia (3) I. Allen Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia.

*Course not offered this academic year.

127. Contemporary East Asia (4) III. Dingerman Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in the social sciences; course 2 or 5 recommended. Human use of the land in East Asia. The nature of resources, agriculture, industry, and society. The impact of economic development on the environment.

131. California (4) III. Lecture—3 hours; discussion—1 hour. The nature and variety of California: urban and rural landscapes. Emphasis on contemporary California and Japan as contrasting paths to economic development.

141. Organization of Economic Space (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal natural, economic, social, political, and cultural factors contributing to the regionalization of the world's economic activities. The role of region and its interaction with the rest of the world.

142. Geography of Agriculture (4) II. Monson Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. The role of agriculture in the development of the world's food-producing regions, and the ways in which agricultural practices have contributed to the evolution of regional strategies within and between countries.

143. Political Geography (4) I. Dingerman Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political systems.

151. History of Geographic Thought (4) III. Monson Lecture—3 hours; term paper. The historical development of geography and its relationship to the evolution of human societies.

155. Urban Geography (4) III. Dingerman Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. The role of urban geography in the study of human settlements and their development.

156. The Urban Region (4) I. Dingerman Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. The role of urban geography in the study of human settlements and their development.


162. Geography of Water Resources (4) III. Shelton Lecture—4 hours. Prerequisite: course 5. Geographical survey of water on the land; its uses, and opportunities for water-resource development and conservation.
needs of specific areas, and geographical problems associated with current and future water requirements.

158. Mountain Geocology: Human Geography (4). Allan Lecture—3 hours; term paper. Prerequisite: course 118, 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 Himalayans, also Andes, Alps, and Rocky Mountains, providing historical perspective and discussion of current environmental crises.

170. Cultural Ecology (4) I, II. Jet Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographical theories of environment-man relations. Ecological relations of gatherers, fishermen, hunters, cultivators, and urbanists; their environmental impacts; their domestic plants and animals. General Education credit: Contemporary Societies.

171. Cultural Geography (4). II. Jet 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. General Education credit: Contemporary Societies.

172. Animals and Culture History (4) III. The Staff Lecture—4 hours. Prerequisite: course 2, Anthropology 2, or consent of instructor. Theories of animal domestication; spread of domesticated animals in Old World and New World; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

173. Humans and Vegetation Change (4) II. Bahre Lecture—4 hours; term paper. Prerequisite: course 1 or Biological Sciences 1A, or consent of instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural plant geography, factors of plant distribution, classification and mapping of vegetation, world vegetation patterns, human impact on major regions, and case studies of land use and vegetation change.

175. Geography of Food and Diet (4) II. Grivetti Lecture—4 hours; term paper. Prerequisite: course 2 or Anthropology 2; Nutrition 20 recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in alternate years.

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.)

Graduate Courses

200. Research Trends in Geography (1) I. The Staff (Chairperson in charge) Seminar—1 hour. Current research themes and trends in geography. (S/U grading only.)

201. Sources and General Literature of Geography (4) I, II, III. The Staff Discussion—4 hours. Prerequisite: graduate status in geography; consent of instructor. Designed for students preparing for higher degree 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) II. Ives Lecture—2 hours, discussion—1 hour; term paper. Prerequisite: course 119 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 climate change. Offered in alternate years.

290. Seminar: Selected Regions (4) III. Ives Seminar—3 hours. Region to be announced annually.

291. Seminar in Cultural Geography (4) III. Jet 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. Shetron Seminar—3 hours.

295. Seminar in Urban Geography (4) I. Dingeman Seminar—3 hours.

296. Seminar in Agricultural Geography (4) III. Allan Seminar—3 hours.

298. Graduate Study (1-12) I, II, III. The Staff Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

Geology

(50.001) Geology

(50.001) Geology

Howard W. Day, Ph.D., Chairman of the Department

Department Office, 174 Physics-Geology Building

(916-752-0300)

Faculty

- Sandra J. Carlson, Ph.D., Lecturer
- Richard Cowen, Ph.D., Senior Lecturer
- Robert E. Cress, Ph.D., Professor
- Howard W. Day, Ph.D., Professor
- James A. Doyle, Ph.D., Professor (Evolution and Ecology)
- Graham E. Fogg, Ph.D., Associate Professor (Land, Air, and Water Resources)
- Anne M. Hofmeister, Ph.D., Associate Professor
- Louise H. Kellogg, Ph.D., Assistant Professor
- Charles E. Lesher, Ph.D., Assistant Professor
- James S. McClan, Ph.D., Associate Professor
- Esiadige M. Moore, Ph.D., Professor
- Jeffrey F. Mount, Ph.D., Assistant Professor
- Philip S. Nigro, Ph.D., Professor
- Howard J. Spero, Ph.D., Assistant Professor
- Robert J. Twiss, Ph.D., Professor
- Gerrit J. Vermeij, Ph.D., Professor
- Kenneth L. Varous, Ph.D., Professor, Academic Senate Distinguished Teaching Award

Emeriti Faculty

- Charles G. Higgin, 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. It is the study of this historical evolution through "deep time" that 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 designed for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. Both programs include twelve units of upper division-electives that provide students an opportunity to emphasize an aspect of the field of particular interest to them. The electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study which must be approved by an undergraduate advisor before they are taken. 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 colleagues and universities provide opportunities in teaching and research. Entry level positions are available with a Bachelor of Science degree. A Master's degree is usually 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. Geoscientists have worked in the California Division of Mines and Geology, the State Department of Water Resources, and various consulting firms.

A.B. Major Requirements:

Preparatory Subject Matter: 44-45
Geology 3, 5, 60, 61, 122, 123
Mathematics 16A-16B-16C or 21A-21B-85B
Physics 2A-2B or 2AH-2BH

Depth Subject Matter: 39
Geology 102, 105, 105C, 106, 110, 110L, 122, 123

Additional upper division electives chosen from upper division courses in geology.

Total Units for the Major: 83-84

*Course not offered this academic year.
Recommended
Chemistry 2C or 2CH, Geology 3, 3L; Statistics 13 or 102.

B.S. Major Requirements:

**Preparatory Subject Matter**

- Geology 3, 3L, 50, 50L, 50L, 60L: 14 units
- Mathematics 21A-21B: 10 units
- One course chosen from: 22B, 22A, 222, 21D, Statistics 32, '02: 12 units
- Chemistry 2A-2B-2C; or preferably 2AH-2BH-2CH: 18 units
- Physics 9A-9B-10C: 12 units

**Depth Subject Matter**

- Geology 102, 105, 105L, 106, 110, 110L, 118, 122, 123: 36 units
- Geology 180 (repeat course at least once): 2 units
- One course chosen from Geology 124, 125: 3 units
- Additional upper division electives chosen from selected courses in geology and related fields approved in advance by the major advisor (see advisor for list of approved courses): 12 units

**Total Units for the Major**: 110-111 units

**Recommended**

Electives for general geology emphasis: Geology 106, 108L, completion of 124, 125 sequence plus one other course (consult advisor).

Additional recommended courses: one or more of the following courses, depending on emphasis in geology: Mathematics 21D, 222, 222, Statistics 104, 105, 108, 110.

**Major Advisors**: A.B. degree: R. Cowen; B.S. degree: R. Cowen, 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.

**General Geology emphasis**: 22 units
- Geology 50 and 50L (or 1, 16, and 1L): 5 units
- Geology 105, 105L, 106: 9 units
- Geology 108 and 108L or 110 and 110L: 5 units
- Geology 113, 115, or 118: 4 units

**Minor Advisors**: H. Cowen, R.J. Twiss.

**Engineering Geology emphasis**: 19 units
- Geology 50 and 50L: 5 units
- Civil Engineering 171, 171L: 12 units
- Three courses chosen from Civil Engineering 175, Geology 17, 17B, 134, Soil Science 118, 120, Water Science 142, 143: 9 units

**Minor Advisor**: R.J. Twiss.

**Geochemistry emphasis**: 18-20 units
- Chemistry 110A, 110C: 6 units (Chemistry majors must substitute one of the elective courses for Chemistry 110C.)
- Geology 50, 50L: 11 units
- One elective course chosen from Chemical Engineering 101, Chemistry 102, Engineering 130, Geology 150A, Soil Science 102, Water Science 100: 5 units

**Minor Advisor**: R.E. Criss.

**Geomorphology emphasis** (Minor under revision; see advisor): 22 units
- Geology 50, 50L: 6 units
- Geology 152 or Geology 106: 4 units
- Geology 153 or Geology 108: 4 units
- Geology 135 or 154: 3 units
- At least six additional units chosen from: Geology 171, 171L, 171T, Geology 112, 117, 118, Soil Science 118, 120, Water Science 141 or Civil Engineering 142: 9 units

**Minor Advisor**: R.E. Criss.

Oceanography emphasis: 20-25 units
- Geology 106, 116, 150A, 150B, 150C: 17 units
- One course chosen from: Environmental Studies 100, 151, Geology 111A, 111B, 111B, 111L, Water Science 180: 3-8 units

**Minor Advisor**: H.J. Spero.

**Paleobiology emphasis**: 16-21 units
- Geology 110 and 110L or 107 and 107L: 7 units
- Geology 111A or 111B, 145 or 146: 7 units
- At least six additional units from the following: Anthropology 151 or 152, Botany 165, 160, Genetics 103, Geology 111A, 111B, 145, 146, 150C, Zoology 105, 112, 125, 146: 6 units

**Minor Advisor**: 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 major requirements.

**Teaching Credential Subject Representative**: R. Cowen. See also Under Teacher Education Program.

**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 Advisor, Department of Geology.

**Graduate Advisers**: J.F. Mount, J.S. McClain, P. Schiffman.

**Courses in Geology (GEL)**

**Lower Division Courses**

1. The Earth (3) I, II. Cowen. II. The Staff. Lecture—3 hours. Prerequisite: course 1 or 2. Honors students are encouraged to study the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 15G. Nature and Environment.

2. Earth Discussion (1) I, II. Cowen. II. The Staff. Discussion—1 hour. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course 1. General Education credit with concurrent enrollment in course 1: Nature and Environment.

3. Earth Laboratory (1) I, II. Cowen. II. The Staff. Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and processes that form them. Not open for credit to students who have taken course 50.

3. History of Life (3) I. 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. General Education credit with concurrent enrollment in course 33: Nature and Environment.


4. History of Life Laboratory (1) I, II. Cowen. Laboratory—3 hours. Prerequisite: course 3 concurrently. Laboratory study of fossiliferous rocks (concretions and nodules). Examination of the geologic features of the earth's crust. Crustal deformation, stress paths and fractures, dikes, fractures, and foliations. Experimental rock deformation.

4G. History of Life Laboratory: Discussion (1) I, II. Cowen. Discussion—1 hour. Prerequisite: course 3 concurrently. Laboratory study of fossiliferous rocks (concretions and nodules). Examination of the geologic features of the earth's crust. Crustal deformation, stress paths and fractures, dikes, fractures, and foliations. Experimental rock deformation.

5. Structural Geology Laboratory (3) I. Cowen. Lecture—3 hours. Laboratory—2 hours. Field study—1 hour. Prerequisite: course 105L, 110, 123 (may be taken concurrently); course 124 or 125 recommended. Introduction to geological mapping techniques; field study of selected areas to expose students to a variety of geologic features. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

105. Structural Geology Laboratory (2) I. Cowen. Lecture—3 hours. Laboratory—2 hours. Field study—1 hour. Prerequisite: course 105. Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

105L. Structural Geology Laboratory (2) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

106. An introduction to the study of structural geology using field methods and field mapping. Preparation of geological maps.

106. An Introduction to Structural Geology (3) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

106L. An Introduction to Structural Geology Laboratory (2) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

106L. An Introduction to Structural Geology Laboratory (2) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

106L. An Introduction to Structural Geology (3) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).

106L. An Introduction to Structural Geology (3) I. Cowen. Lecture—2 hours; laboratory—2 hours. Field study—1 hour. Prerequisite: course 105 (concurrently). Students may take course 105L concurrently. Preparation of geological maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is required (30 percent minimum).
107. Principles of Paleobiology (3) III. Signor
Lecture—3 hours. Prerequisite: courses 3-3L, or Biological Sciences 1B, 1C. The evolution and ecological structure of the biosphere from the origin of life to the present, with special emphasis on the oceanic environment during the last 800 million years. No credit allowed to those who have completed course 110L.

108. Regional Structure and Stratigraphy (3) II. Moore
Laboratory—6 hours; two one-day field trips. Prerequisite: courses 105, 105L, 106. Global tectonic features and processes. Structure, stratigraphy, and evolution of large-scale features of the earth’s crust, shields and platforms, continental margins, ocean basins, plate boundaries and mountain belts.

108L. Regional Structure and Stratigraphy Laboratory (2) II. Moore
Laboratory—6 hours; two one-day field trips. Prerequisite: courses 105, 105L, 106. Global tectonic features and processes. Structure, stratigraphy, and evolution of large-scale features of the earth’s crust, shields and platforms, continental margins, ocean basins, plate boundaries and mountain belts. Not open to students who have received credit for course 108.

110. Introductory Paleontology (3) I. Vermeij
Lecture—3 hours. Prerequisite: courses 3, 3L. Provides geology majors with a thorough introduction to the fossil record, interpretation of data from the fossil record, and major trends of evolution. Special emphasis on the interpretation of fossil paleoecology and paleobiology.

**111A. Paleobiology of Invertebrata (4) I. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates. Offered in alternate years.

111B. Paleobiology of Protista (4) II. Spero
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms. Offered in alternate years.

113. The Solar System (3) III. Hofmeister

113G. The Solar System: Discussion (1) III. Hofmeister
Discussion—1 hour. Prerequisite: course 113 concurrently. Small group discussion and preparation of papers. Credit in course 113. General Education credit with concurrent enrollment in course 113G. Nature and Environment.

114. Climates of the Past: Key to the Future (3) II. Spero
Lecture—3 hours. Prerequisite: Chemistry 2A or course 1 or Biological Sciences 1A or the equivalent. Analysis of present day evidence for climatic warming and the greenhouse effect with comparison to the history of Earth’s climate fluctuations over the last 70 million years. Past and present climate records are used to examine future climatic scenarios.

115. Geochemistry (3) I. Crisis
Lecture—3 hours. Prerequisite: Chemistry 2A (may be taken concurrently). Course 50. Application of principles of solution, physical, structural, colloid, and isothermal chemical equilibria to the formation of carbonate rocks and other chemical sediments, rock weathering, and clay mineral formation. Magmatic, metamorphic, and hydrothermal processes and radiometric dating techniques.

116. The Oceans (3) I. Spero; II. Cowen, Suchanek
Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geologic history, and the sea’s biota; and utilization of marine resources. (Same course as Environmental Studies 116.) General Education credit with concurrent enrollment in course 116B. Nature and Environment.

116G. The Oceans: Discussion (2) I. Spero; II. Cowen, Suchanek
Discussion—2 hours. Prerequisite: course 116; Environmental Studies 116 concurrently. Scientific method applied to discovery of the processes, biota and history of the ocean; and preparation and presentation of papers. (Same course as Environmental Studies 116G.) General Education credit with concurrent enrollment in course 116G. Nature and Environment.

117A. Exploration Geophysics and Seismology (3) I. McClain
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 6C or 6C, 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 computerized tomography and back-propagation techniques. Seismology and earthquakes.

117B. Geophysics of the Solid Earth (3) II. Kellogg
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 6C or 6C, 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.

117C. Fluid Flow in the Earth (3) II. Kellogg

118. Summer Field Geology (8) Extra-session summer. The Staff
Six weeks in field. Prerequisite: course 102. Preparation of a geologic map and report on a selected field area.

119. Field Studies in Marine Paleontology (9)
Summer Farmer
Lecture—12 hours; laboratory—25 hours. Prerequisite: one course in biology or geology and consent of instructor. Lectures and field-study laboratory of physical and biological aspects of nearshore marine environments and the reconstruction of ancient environments through the study of fossil assemblages and sedimentary rocks in nearby coastal areas. Full-time residence at Bodega Marine Laboratory is required. A $250.00 lab fee is required.

122. Optical Mineralogy (3) II. Day
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 60, 60L, or consent of instructor. Optical properties of minerals and techniques of mineral identification with the petrographic microscope.

123. Igneous Petrology (5) I. Lester
Lecture—4 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

124. Sedimentary Petrology (5) II. Mount
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

125. Metamorphic Petrology (5) I. Day
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 123. Recognition and origin of metamorphic rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

130. Non-Renewable Natural Resources (3) II. Crisis
Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing minerals. Problems of discovery, production, and management. Estimation and limitations of reserves, and their sociopolitical, political, and economic effects.

131. Earth Science, History, and People (4)
I. Cowen
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; coreq. 1. Study of interplay between the earth and its human inhabitants through history, including consideration of climate and human events like earthquakes and eruptions as well as the geology of landscapes, biography, and art. General Education credit: Nature and Environment.

134. Environmental Geology and Land Use Planning (3) II. The Staff
Lecture—2 hours; discussion—laboratory—3 hours. Prerequisite: courses 1, 10, and 10L. Analysis of the conflict between geologic processes and the urbanization and resource exploitation of California’s watersheds. Geologic, logging, and environmental case studies of Sierra Nevada watersheds. Field study includes two raft trips on Sierran rivers and visit to Auburn Dam site. General Education credit: Nature and Environment.

140. Geologic Data Collection and Report Preparation (3) II. The Staff
Lecture—2 hours; discussion—laboratory—3 hours. Prerequisite: upper division standing; coreq. 1. Data collection, analysis and reporting of geologic data. Field crews will analyze published reports, write syntheses of published reports and write abstracts.

144. Evolution and the Fossil Record (4) II. Signor
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Principles of evolution from the special fossil record. Fossils and inferences on the origin of species and higher taxa. Survey of adaptive radiations and major extinctions.

150A. Physical and Chemical Oceanography (4)
I. Powell (Environmental Studies)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 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 ecological cycles. Offered in alternate years. (Same course as Environmental Studies 150A.)
Course not offered this academic year.

Microscopic, structural aspects of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallographic orientations. Offered in alternate years.

219. Special Studies in Marine Geology and Paleoecology (6-9) Summer. Farmer Discussion—5 hours; seminar—3 hours; laboratory—20 hours. Prerequisite: graduate standing or completion of course 119, and consent of instructor. Independent field and laboratory investigation of selected topics in marine geology and paleoecology.

220. Geology of Marine Structures (3) II. 
Twice
Lecture—2 hours; seminar—1 hour. Prerequisite: course 126, or consent of instructor and course 105. Application of principles of continuum mechanics to understanding development of geologic structures such as folds, fractures, faults, dikes, cleavage, and faulting. Offered in alternate years.

223. Advanced Sedimentation and Sedimentary Petrology (4) III. 
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 124 or consent of instructor. Advanced petrographic and stratigraphic study of major sedimentary rock suites. Lecture emphasis on recognition and interpretation of the spatial and temporal variations in sedimentary rock textures and microtextures. Laboratory work is focused on provenance and diagenesis. Subjects vary yearly. May be repeated for credit. Offered in alternate years.

227. Stable Isotope Biogeochemistry (3) III. 
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Application of stable isotope techniques to paleoclimatic, paleoecologic, paleoceanographic, ecological, and anthropogenic research problems. Emphasis on carbon, oxygen, nitrogen, hydrogen and sulfur stable isotopes.

228. Marine Geology (3) III. 
Lecture—3 hours. Prerequisite: courses 106, 116, or 150B, or consent of instructor. Critical discussion and review of selected topics in marine geology such as paleoceanography, biostatigraphy of the ocean basin, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated twice for credit.

230. Advanced Mineralogy (3) II. Hofmeister Lecture—3 hours. Prerequisite: introductory mineralogy and differential equations or consent of instructor. Crystallography and crystal chemistry of rock-forming minerals and high pressure phases. Mechanism of phase transformations, with emphasis on pressure-induced polymorphism. Effect of kinetics and diffusion on mineral behavior. Processes of solution, recrystallization, and crystallization. Offered in alternate years.

231. Mineral Physics Seminar (3) II. Hofmeister Seminar—3 hours. Prerequisite: course 230. Critical review of selected topics in mineral physics (e.g., the earth’s thermal state; elastic properties and equations of state; phase transitions and mantle petrology; earth’s structure and its evolution; transport phenomena in the earth’s interior). May be repeated for credit.

232. Spectroscopic Methods in the Geosciences (3) II. Hofmeister Lecture—3 hours. Prerequisite: course 230 or consent of instructor. Overview of spectroscopic methods used in mineralogy and geology. Theory and practice of the infrared technique. Use of symmetry to establish type and number of vibrational modes. Raman, optical, Mossbauer, EPR and NMR methods. Interpretation of vibrational data in terms of theoretical problems. Offered in alternate years.

289. Evolutionary Biology of Protists (3) II. The Staff Seminar—3 hours. Prerequisite: course 111B. 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.

290. Igneous Petrology (3) III. Leshier Seminar—4 hours. Prerequisite: course 123. Integrated laboratory, field study, and seminar on igneous processes and products.


293. Petrologic Petrology (5) II. Tiselius Lecture—3 hours; laboratory—6 hours. Prerequisite: course 125 or consent of instructor. Metamorphic processes; origins and characteristics of metamorphic rocks. Laboratory study of representative rocks in thin section. Offered in alternate years.

294. Physical Chemistry of Metamorphic Processes (3) I. Day Lecture—3 hours. Prerequisite: course 125, Chemistry 110A, or consent of instructor. Physical-chemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years.

295. Geophysical Petrology Seminar (3) I. Day Seminar—3 hours. Prerequisite: course 245; course 246 recommended. Selected topics in geophysical petrology (e.g., magmatisms, processes, tectonic settings, geothermometry, structural maps of metamorphic rocks, regional studies). May be repeated for credit when topic is different. Offered in alternate years.

296. Advanced Geochemistry Seminar (3) I. Criss Seminar—3 hours. Prerequisite: course 115 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.

297. Phase Equilibria (3) I. The Staff Seminar—3 hours. Prerequisite: Chemistry 2C and Mathematics 22A; physical chemistry recommended. Physicochemical aspects of the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks.

298. Paleontology (3) I. Carlson; II. Sigors; III. Vermeij Seminar—3 hours. Prerequisite: graduate standing in geology or a biological sciences. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. May be repeated for credit when topic varies.

299. Functional Morphology of Fossil Invertebrates (3) III. Cowen Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate phyia. Offered in alternate years.
The Degree of Doctor of Philosophy. The Department offers programs of study and research leading to the Ph.D. degree in the following areas: Interdisciplinary programs in the Humanities, as well as the Social Sciences, as well as the Natural Sciences. The Ph.D. program in the Department is designed to provide the opportunity for students to prepare for the designated emphasis in Critical Theory, an interdisciplinary program focusing on the issues and a few area studies. This information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

Graduate Advisers: A. Kuhn, H. Schneider

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 of high school German, 3; those with four years of high school German.

1. Elementary German (GER) I, II, III. Henderson in charge. Lecture—5 hours; laboratory—two 2-hour sessions. Introduction to German grammar and development of all language skills in a contextual setting 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 higher credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.

1. Elementary Honors German (GER) I, II, III. Henderson in charge. Lecture/discussion—5 hours. Prerequisites: overall high school GPA of 3.5 or GPA of 3.5 in German for students with prior knowledge of German. Accelerated and considerably expanded introduction to German language, short literary texts, and culture accompanied by computer-assisted grammar instruction. Material covered in courses 1H and 2H is the equivalent of that covered in courses 1, 2, and 3.

2. Elementary German (GER) 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.

2. Elementary Honors German (GER) I, II, III. Henderson in charge. Lecture/discussion—5 hours. Prerequisite: completion of course 1H with minimum GPA of 3.3 or GPA of 3.5 for incoming students. Completion of the accelerated and expanded first-year program with special emphasis on the social and linguistic context, literary texts, and computer-assisted grammar instruction.

3. Elementary German (GER) I, II, III. Henderson in charge. Discussion—6 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.


6. Conversational German (GER) I, II, III. Henderson in charge. Discussion—3 hours. Prerequisite: course 3. Designed to develop intermediate language skills with special emphasis on communication and communicative accuracy. Course 6 may be taken concurrently with course 4.

10. Basic Reading German (GER) III. 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.

Intermediate Reading German (GER) III. The Staff. Discussion—3 hours. Prerequisite: successful completion of course 10 or its equivalent. Continuation of course 10. Study of advanced reading grammar to gain proficiency with texts of intermediate difficulty. (P/NP grading only.)

Advanced Reading German (GER) III. The Staff. Discussion—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total artwork" concept and The Ring of the Nibelung cycle. May not be counted toward major in German. General Education credit: Civilization and Culture.

Freshman Colloquium (GER) II. The Staff. Discussion—2 hours; term paper. Prerequisite: 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 communistic-capitalist tension in German literature, mas- culine "versus" feminine authorial consciousness, disintegration and reconstitution of language reflecting cultural transformation, exercising post-holocaust national guilt and individual frustration—Germany's new European "mission."

Survey of German Culture (GER) II. Asman. Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Characteristic themes in the mainstream of German culture from medieval intellectual and artistic achievements to the modern period. Study of major developments in arts and literature. Frequent short written reports and in-class expository presentations. General Education credit: Civilization and Culture.

Introduction to Literary Analysis (GER) I. Mengers. Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Introductory study of various genres of German literature, with emphasis on the interrelationship between form and content and the impact on contemporary literary appreciation.

Great Books of German Culture in English Translation: The Age of Faith (GER) I. The Staff. Lecture—2 hours. Prerequisite: course 50 recommended. The transformation of ideas resulting from the German cultural experience and its expression within the context of the general Western development from Charlemagne through medieval chivalry to Luther and Grimmelshausen. Knowledge of German not required. General Education credit: Civilization and Culture.

Great Books of German Culture in English Translation: The Age of Reason (GER) II. The Staff. Lecture—2 hours. Prerequisite: course 50 recommended. The significant cross-currents in the history of ideas as these shaped the German cultural experience, from the Reformation and the waning Holy Roman Empire, through the Enlightenment and Lessing to Weimar's Classicism and its 19th-century transformations in Romantic Idealism. Knowledge of German not required. General Education credit: Civilization and Culture.

Great Books of German Culture in English Translation: The Age of Relativity (GER) III. The Staff. Lecture—2 hours. Prerequisite: course 50 recommended. The conflict between European and individual consciousness and national cultural identity, from Büchner, Wagner and Nietzsche, through bourgeois and Freudian realism.
to the post-World War ethical critiques of Mann, Brecht, Grass and Handke, culminating in capital-English translation and its resolution. Knowledge of German not required. General Education credit: Civilization and Culture.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Pre requisite: 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
100A. Advanced German Conversation (2) I. The Staff
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100B. Advanced German Conversation (2) II. The Staff
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2) III. The Staff
Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

101. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; written reports. Prerequisite: course 4 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

102. Composition and Conversation (4) I, II, III. The Staff
Discussion—3 hours; written reports. Prerequisite: course 101 or consent of instructor. Practice in short essay writing with an aim toward refinement and expansion of vocabulary based on readings in a variety of German texts.

103. Writing Skills in German (4) I, II, III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 101. 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
Discussion—3 hours; written reports. Prerequisite: course 104 or the equivalent. Exercises in German to English translation and non-technical works of different styles and linguistic difficulty.

104B. Advanced Translation (4) I. McConnell
Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German to English translation and non-technical works of different styles and linguistic difficulty.

105. The Modern German Language (4) I. Benware
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 105 or Lingual 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 102; course 105 or Lingual 1 recommended. Survey of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4) I. Benware
Discussion—3 hours; term paper. Prerequisite: course 102 or the equivalent or consent of instructor; Lingual 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 102, 105. Study of relations between 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) I. Henderson
Lecture/discussion—4 hours. Prerequisite: course 101 or consent of instructor. Specialized advanced language course using business-oriented materials and focusing on principles of negotiation, signaling, letters, contracts, translations.

109B. Advanced Business German (4) II. 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 new topics such as the EC, the European Currency System, German company structure and the stock market. Offered in alternate years.

110. Older German Literature in English (4) I. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Analysis in English of German literature from the Middle Ages through the Reformation (Nibelungenlied, Goethe's Tristan and Isolde, etc.) and reading of works of Parzival, lyric poetry, selections from Johann von Tepl, Conrad Celtes, Sebastian Brant, Erasmus, Luther. General Education credit: Civilization and Culture.

111A-H. Major Writers in Translation (4) I. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: sophomore standing; course 50, or 52A or 52B (as appropriate to current semester topic) 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) Goethe; (B) E.T.A. Hoffmann; (C) Thomas Mann; (D) Friedrich Nietzsche; (E) Christa Wolf; (F) Günter Grass; (G) Friedrich Schiller. General Education credit, 111A or 111E: Civilization and Culture.

112A-C. Topics in German Literature (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 50 and 52A or 52B or 52C recommended. Survey of important themes and issues within their European context: (A) Women in Literature; (B) Anti-Hero Figures in Literature; (C) Literary Fairytales. Knowledge of German not required. May be repeated in different subject area. General Education credit for 112A, 112B: Civilization and Culture.

113. Goethe’s Faust I and II. Bend, Schaeffer
Discussion—3 hours; term paper. Prerequisite: 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. General Education credit: Civilization and Culture.

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 chauvinists of 1587, Marlowe's Tragic 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. General Education credit: Civilization and Culture.

115A. German Literature Since 1945 (4) I. Menges
Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading of major writers including the postwar period in Switzerland and West Germany. Discussion of novels as Böll, Grass, Johnson, Walsor, Handke, playwrights such as Frisch, Dörrnmet and Hochhuth, and poets like Celans, Enzensberger, and Aichinger. General Education credit: Civilization and Culture.

115B. German Literature Since 1945 (4) II. Kuhn
Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading and discussion of the literature of the German Democratic Republic (East Germany), the theory of literature in the social-ist world, the practice of this literature as exemplified in such authors as Stittmatter, Seghers, Wolf, Kant, etc. General Education credit: Civilization and Culture.

116. From Goethe’s Werther to Today’s Werthers (4) I. The Staff
Lecture—3 hours; discussion—1 hour; written reports. Prerequisite: course 51 or 52B recommended. Comparative study of the first international bestseller, Goethe's The Sufferings of Young Werther (1774) with its later counterparts, culminating in Pfenzler's novel of 1973 The New Sufferings of Young W. General Education credit: Civilization and Culture.

117A. The Tristan Tradition: Medieval, Musical, Modern (4) III. McConnell
Lecture—3 hours; term paper. Prerequisite: courses 51, 52A, and Music 10 recommended. Three different models of the Tristan and Isolde legend: the medieval epic poem; the Tristan of Wolfram and Thomas Mann’s Die Zauberflote. General Education credit: Civilization and Culture.

117B. The Nibelungen Tradition: Medieval, Musical, Modern (4) III. Fetzler, McCracken
Lecture—3 hours; term paper. Prerequisite: course 51 or 52A or Music 10 recommended. Knowledge of German not required. Three models of the Nibelungen legend: The Medieval epic poem: Nibelungenlied, the Scandinavian Volsungasage, Wagner’s music drama Ring of the Nibelungen, and Thomas Mann’s Die Zauberflote. General Education credit: Civilization and Culture.

117C. Parzival Tradition: Medieval, Musical, Modern (4) III. McConnell
Lecture—3 hours; term paper. Prerequisite: Music 10 and course 51 recommended. Three modes of the Parzival legend: The medieval epic, Parzival, Wagner’s music drama Parsifal, and Thomas Mann’s The Magic Mountain, and the intellectual environment in which it was written and interrelationship. Knowledge of German not required. General Education credit: Civilization and Culture.

118A. Fin-de-siécle Vienna (The Swan Song of the Habsburg Empire) (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with contributions from writers in literature, music, graphic arts, architecture, philosophy, and psychology, heralding European modernism. Offered in alternate years. General Education credit: Civilization and Culture.

118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4) II. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). 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 1919-1933. Offered in alternate years. General Education credit: Civilization and Culture.

118C. Germany Under the Third Reich (4) I. Kuhn
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: German 118B and History 147B recommended. 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 aesthetics. Everyday life in Hitler's Germany: consent, dissent, opposition, and resistance; Jews in Germany; the Holocaust. General Education credit: Civilization and Culture.

118E. Contemporary German Culture (4) I. Schneider
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50. Thorough introduction into the political, economic, social and cultural scene of Germany today (Autumn session only). Historical background and comparative perspectives. Readings from a variety of sources,
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 novelists' works and plays to ascertain the changes and implications of the medium.
120. Survey of German Culture (4) III. Fetzler
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Major developments in such areas as art, philosophy, science, institutions, and political history.
121. The Medieval Period in German Literature (4) I. McConnell
Discussion—3 hours; term paper. Prerequisite: course 101. Literary-philosophical profile of the Middle Ages.
122. The Literary Baroque (4) II. Schaeffer
Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Early modern literary works of the seventeenth century tracing the principles of development and showing the reflection in literature of the social scene.
123. Literature of the Classical Age (4) I. Schneider
Discussion—3 hours; term paper. Prerequisite: course 101. The rise of classicism in the eighteenth century tracing the principles of development and showing the reflection in literature of the social scene.
124A-D. Major Movements in German Literature (4) I, II, III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 101 or equivalent. Examination of significant movements and schools, with particular emphasis on the broader cultural dynamics and ideologies as they apply to individual literary works.
125. Short Fiction Around 1900 (4) II. Schaeffer
Lecture—3 hours; term paper. Prerequisite: course 101. A representative sample of German fiction of the fin-de-siècle period, to attain conversation with various prose styles and the cultural currents of the period.
126. Modern German Literature (4) I. Menges
Discussion—3 hours; term paper. Prerequisite: course 101. Selections from the major works of modern German literature, such as Hofmannsthal, Kafka, Rilke, Brecht, Grass. Many be repeated for credit with consent of Undergraduate Major Advisor.
127A-G. Studies in Major Writers (4) III. The Staff
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 101 or equivalent; course 120. and the appropriate segments of course 52A-52B-52C 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; (E) George and Hofmannsthal; (F) Brecht; (G) Schiller; (H) Kleist. Course presentation in German. May be repeated for credit when subject area differs.
128A-B. Topics in German Literature (4) I, II, III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 101 or the equivalent. Investigation of specific themes and issues within their European context.
129. Postwar Women Writers (4) III. Finney
Discussion—3 hours; term paper. Prerequisite: course 101. Survey of women's writing in German since 1945. Consideration of the emergence of "women's writing" and of a feminist aesthetics. Writers include Seidel, Bachmann, Wolf, Kirsch, Modgen, Wohmann, Stefan, and Schwages.
130. Modernity and Its Discontents: The Tradition of German Cultural Critique (4) III. Schaeffer
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101. The study of the German novel from Goethe to Kafka.
131. German Lyric Poetry (4) I. Schneider
Lecture—3 hours; term paper. Prerequisite: course 101. Study of the genre of lyric poetry from late Middle Ages to Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period.
132. The German Novel (4) I. Bernd
Lecture—3 hours; term paper. Prerequisite: course 101. The development of the modern novel in Germany from the eighteenth century to the present, with particular emphasis on the development of the novel form.
133. The German Drama (4) III. Bernd
Lecture—3 hours; term paper. Prerequisite: course 101. The study of German drama from the eighteenth century to the present, with particular emphasis on the development of the drama form.
134. German Political Literature from the Middle Ages to the Present (4) I. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The development of German political literature from the Middle Ages to the present.
135. The Holocaust and Its Literary Representation (4) I. Menges
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 101. Examination of the literary representation of the Holocaust in its historical and political context.
136. New German Cinema: From Oberhausen to the Present (4) I. Schaeffer
Lecture—3 hours; discussion—1 hour. A survey of contemporary German film, focusing on the development of the New German Cinema.
137. Contemporary German Press (4) I. Schaeffer
Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Study of contemporary German-language newspapers and magazines for insight into political and cultural developments in German-speaking countries. Discussion of content, editorial approaches, writing of summaries, rebuttals, comments.
138. Love in the Middle Ages (4) I. McConnell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Analysis of the phenomenon of love in selected medieval romances of the twelfth and thirteenth centuries. Origins of courtly love, love and individualism, love and the Church, love and adultery.
139. The German Epigram (4) II. Schaeffer
Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Study of the epigram as a genre and its function as a mirror of history.
140. Die Meistersinger (4) III. Schaeffer
Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Wagner's opera Die Meistersinger von Nürnberg against the background of the city's cultural history, the history of Meistersinger and the historical Hans Sachs, to show the relationships of words to music, and the resulting musical, dramatic, and literary work of art.
141. The Aesthetic Age of Bismarck (4) III. Bernd
Discussion—3 hours; term paper. Prerequisite: course 101. Study of the development of the modern novel in Germany from the eighteenth century to the present, with particular emphasis on the development of the novel form.
142. Field Work in German (1-12) I, II, III. Henderson
Internship—3-36 hours. Prerequisite: course 101. Internship with a German-speaking company or organization. Participation in various business activities where expertise in German is expected and further developed. (P/NP grading only.)
143A-149A. Honors Program (3-3) I-II. The Staff
Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.5 minimum GPA in at least 15 credits. (A) Research of an integrative nature (in either "General" or "Area Studies" emphasis) under advisement of the faculty 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.)
147. Tutoring German (2-4) I. Henderson
Lecture—2-4 hours; term paper. Prerequisite: course 102 or consent of instructor. Tutoring and leading of special discussion sections in first-year language classes. Offers teaching and leading assignments to a limited number of students. (P/NP grading only.)
149. Directed Study (1-5) I, II, III. The Staff
Chairperson in charge (P/NP grading only.)
150. Special Study for Advanced Undergraduates (1-9) I, II, III. The Staff
Chairperson in charge (P/NP grading only.)
Graduate Courses
200A. German Colloquium Series (2) I. The Staff
Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (Middle Ages to 1790), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only.)
200B. German Colloquium Series (2) II. The Staff
Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (1790-1900), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only.)
200C. German Colloquium Series (2) III. The Staff
Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (1900 to present), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only.)
202. Middle High German (4) II. Berne
Discussion—3 hours; lecture—1 hour. Outline of grammar and syntax 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 interpretive tools and resources for advanced, independent research.

211. Concepts in Literary Theory (4) II. Schneider
Seminar—3 hours; written report. 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) II. 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.

240. Forms of German Verse (4) II. Sammen-Frankenberg
Seminar—3 hours; term paper. The development of German verse from the Middle Ages to the present, with special emphasis on different types of verse 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 dramatic literature from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.

242. The German Novel (4) II. Bernd
Seminar—3 hours; term paper. The major German Novellists 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 16th century to the present. Authors treated include Lessing, Kleist, Büchner, Einhorn-Eschenbach, Hauptmann, Holmsthal, Frisch, Langer, and Jelinek. Offered in alternate years.

252. The Writings of Lessing (4) I. Schneider
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) II. The Staff
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 sensibility 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. Schneider
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, and social criticism. May be repeated for credit with consent of instructor.

259. Studies in Kafka (4) II. Asman
Seminar—3 hours; term paper. Study of Kafka’s narrative techniques with special emphasis in the shorter works on the existentialist development from its roots in expressionism.

260. The Poetry of Rilke (4) II. Menges
Seminar—3 hours; term paper. Study of Rilke’s 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 literar­ y currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychoanalysis, the visual arts, philosophy, and music. Authors treated include Hauptmann, Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Holmsthal. 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. Individualized 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 research from a faculty member—1 hour. Prerequisite: course 270A. Individualized guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic dissertation (thesis) materials (e.g., 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. Individualized guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic dissertation (thesis) materials (e.g., 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. McNicoll
Seminar—3 hours; term paper. Prerequisite: course 250 or consent of instructor. Comprehensive reading of Middle High German texts in the original language. Examines linguistic and literary problems. May be repeated for credit with change of subject matter and consent of instructor.

286. The Renaissance and Reforma­tion in German Literature (4) I. Schaeffer
Seminar—3 hours; term paper. The parabolical 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 "Elegantiadeal" 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. Revolution against the concept of the "Elegantiadeal," 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) I. Menges
Seminar—3 hours; written report. 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. Schneider
Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany’s greatest literary period. May be repeated for credit with consent of instructor.

294. The Romantic Period in German Literature (4) III. 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 (Chairperson in charge)
Seminar—3 hours; term paper. Various special topics in German literature, which may cut across the forms 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)
(SU grading only.

300. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.

297F. Special Study for the Master’s Thesis (5) I, II.
The Staff
Independent study—5 hours; term paper/discussion—1 hour. Prerequisite: acceptance into M.A. Plan I Thesis Option. Intensive research and tutorial guidance for candidates accepted into Plan I of the Master’s program, culminating in a complete draft of the Thesis text (min. 50 pp.) scheduled for final submission between June and September of the same year. (SU 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. (SU 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. (SU 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. (SU grading only.

391. Teaching Practicum and Coaching Conference (1) I, II, III. Henderson
Conference—1 hour. Prerequisite: appointment as Teaching Assistant; course 390A, 390B, 390C. Ongoing consultation with Language Teaching Supervisor concerning application of technique and innovations within Teaching Assistant’s classroom responsibility. Required of all Teaching Assistants after first year of appointment. May be repeated for credit. (SU grading only.

*Course not offered this academic year.
History
(College of Letters and Science)
Barbara Metcalf, Ph.D., Chairperson of the Department
Department Office, 176 Voorhis Hall (916-752-0776)

Faculty
Arnold J. Bauer, Ph.D., Professor
William M. Bowkay, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
Beverly Bossler, Ph.D., Assistant Professor
Daniel R. Brower, Jr., Ph.D., Professor
Robert O. Crumley, Ph.D., Professor
Betty Jo Teeter Doobs, Ph.D., Professor
Paula E. Findlen, Ph.D., Assistant Professor
Paul Goodman, Ph.D., Professor
William W. Hagen, Ph.D., Professor
Karen Haughton, Ph.D., Professor
David L. Jacobson, Ph.D., Professor
Phyllis J. Jessice, Ph.D., Assistant Professor
Catherine J. Kudlick, Ph.D., Assistant Professor
Norma B. Landau, Ph.D., Professor
Susan L. Mann, Ph.D., Professor
Roland Marchand, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Ted W. Margadant, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor
Don C. Price, Ph.D., Professor
Ruth E. Rosen, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Morton Rothstein, Ph.D., Professor
Ronald Sale, Ph.D., Assistant Professor
John M. Smith, Ph.D., Associate Professor
Kathleen Stuart, Ph.D., Assistant Professor
Stylianos Spyridakis, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Charles Walker, Ph.D., Assistant Professor
Clarence E. Walker, Jr., Ph.D., Professor
Emeriti Faculty
David Brody, Ph.D., Professor Emeritus
Daniel H. Caudill, Ph.D., Professor Emeritus
Manfred F. Fletcher, Ph.D., Professor Emeritus
Tina Turrentine Jackson, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Kwang-Ching Liu, Ph.D., Professor Emeritus
Rolle E. Poppino, Ph.D., Professor Emeritus
Richard N. Schwartz, Ph.D., Professor Emeritus
Morgan B. Sherwood, Ph.D., Professor Emeritus
James F. Shilder, 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

Preparatory Subject Matter

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Plans I, II, and III)</td>
<td>20</td>
</tr>
</tbody>
</table>

Five lower division courses, including at least two from each of the following fields: a. Western Civilization: History 4A, 4B, 4C, 4D, 3, 10, 30

b. Asian Civilization: History 8, 9A, 9B


d. Africa: History 15

Depth Subject Matter—Plan I

At least six upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Plans I, II, and III)</td>
<td>40-41</td>
</tr>
</tbody>
</table>

At least three upper division courses from one of the other fields listed.

At least one course from the following: History 101, or 102 in field of concentration; in exceptional circumstances, a student may with the permission of an adviser, take the seminar in another field), or 103 in (field of concentration).

Total Units for the Major, Plan I

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Plans I, II, and III)</td>
<td>60-61</td>
</tr>
</tbody>
</table>

Depth Subject Matter—Plan II

At least four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses.

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Plans I, II, and III)</td>
<td>42</td>
</tr>
</tbody>
</table>

At least three upper division courses from one of the other fields listed.

History 101

History 102 in field of concentration: in exceptional circumstances, a student may with the permission of an adviser, take the seminar in another field), or 103 in (field of concentration).

History 103 in field of concentration.

Total Units for the Major, Plan II

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Plans I, II, and III)</td>
<td>62</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.

Minor Program Requirements:
History units may be taken in a single field of concentration, such as Africa, East Asia, Europe, Latin America, or the United States. Alternatively, students may select a minor with a thematic emphasis, as listed below, or design a thematic minor in consultation with a Department advisor.

UNITS

History

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 for major advisers.

Honors and Honors Program: A student becomes eligible for graduation with honors by meeting the minimum grade-point average and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the History Department honors program with a grade-point average of 3.5 or above in honors courses. Students will be invited to participate in the department honors program during the latter part of their junior year on the basis of grade-point average, interviews, and faculty recommendations. They are required to complete the History 104A, 104B, 104C sequence of honors courses, which includes the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to consult at least one History 102 (undergraduate seminar) before the end of their junior year. They may follow any of the three plans for depth subject matter 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.

Teaching Credential Subject Representative: D.L. Jacobson. 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 accomplished for those students currently in the major, 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.

Education at Home Program (EHP). In the Winter Quarter of 1990, the UCR campus will continue the Education at Home Program for those students with special interest in early American history and culture. Those enrolled in this program will spend nine weeks in Williamsburg, one in Philadelphia, and a concluding week in Washington, D.C. This program is open to all undergraduates from any campus in the UC system. With prior approval of their graduate advisor, graduate students may also apply. Registration (through the Riverside campus) will be made for the following courses in the Department of History: 157, 158, and 159. Special arrangements for international student study (maximum of 4 units only) may be made with the student's home campus. For further information, brochures or application forms, telephone Riverside campus, (714) 787-3820. Preference is given to applications received by June 30; the final application deadline is November 1.

Graduate Study: The Department of History offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.


American History and Institutions: This University requirement can be satisfied by passing any one of the following courses in History: 147A, 17A, 17B, 17C, 17D, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 176C, 176D, 178A, 178B, 180A, 180B, 183A, 185B. 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


4A. History of Western Civilization (4) I. Jestice Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture.

4B. History of Western Civilization (4) II, III. The Staff Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture.

4C. History of Western Civilization (4) II. The Staff Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture.

8. History of Indian Civilization (4) II. Metcalf 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 economic organization, and art and literature that reflect cultural interaction and change. General Education credit: Civilization and Culture.

9A. History of East Asian Civilization (4) I, III. The Staff 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. General Education credit: Civilization and Culture.

9B. History of East Asian Civilization (4) I. The Staff 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.

10. World History of the Twentieth Century (4) III. Brower Lecture—3 hours; discussion—1 hour. History of the world in the twentieth century, emphasizing major powers and their leaders (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Guevara, Nasser, Castro). General Education credit: Contemporary Societies.

15. Introduction to African History (4) I. Brantly 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.

17A. History of the United States (4) III. Halvahlen Lecture—3 hours; discussion—1 hour. Growth of the American people from Colonial times to 1815. General Education credit: Civilization and Culture.

17B. History of the United States (4) I. Walker Lecture—3 hours; discussion—1 hour. Growth of the American people from 1815 to 1915. General Education credit: Civilization and Culture.

17C. History of the United States (4) II. Marchand Lecture—3 hours; discussion—1 hour. Growth of the American people from 1915 to the present.

*25. Thematic History Seminar (4) I. The Staff Seminar—3 terms; term paper. Prerequisite: freshman or sophomore standing. Limited to in-depth historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretations.

*30. Russian Cultural History (4) I. Sonnemey 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. General Education credit: Civilization and Culture.

72A. Social History of American Women and the Family (4) I. Rosen 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 industrialization, commercialization, and industrialization of American society. General Education credit: Civilization and Culture.

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 of all class women, consumerism, the role of media, the "feminine mystique," changes in family life, and the emergent women's movement. General Education credit: Civilization and Culture or Contemporary Societies.


96. Quackery and Pseudoscience in America (4) Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in America: witchcraft, medicine, nativism, science hoaxes, technological frauds, literary and artistic forgeries, UFOs, pyramidology, astrology, psychical phenomena. Emphasis upon explanations for the existence of such unschooled pseudoscience.

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. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

*101. Introduction to Historical Thought and Writing (5) III. The Staff Lecture/discussion—4 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing, including historical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing.

102A-X. Undergraduate Proseminar in History (1-5) 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;
143. History of Eastern Europe and the Balkans (4) I. 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; nationalism movements 1914; the twentieth century, including an analysis of the contemporary scene.

144. History of Germany since 1848 (4) I. The Staff
   Lecture—3 hours; essays. Social and political history of Germany in the ages of absolutism and the Enlightenment, industrialization and national unification, the World Wars, and since 1945.

145. War and Revolution in Europe, 1789-1918 (4) I. Margadant
   Lecture—3 hours; term paper. Survey of revolutionary moments of the twentieth century, including the French Revolution and World War I.

*146A. Europe in the Twentieth Century (4) I. The Staff
   Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939.

146B. Europe in the Twentieth Century (4) II. Wilks
   Lecture—3 hours; term paper. Survey of the history of Europe since 1939.

147A. European Intellectual History, 1800-1870 (4) III. Sailer
   Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to science; liberal and socialist reactions to social change. Focus on the work of Goethe, Herder, Fichte, Marx, Darwin and Flaubert.
   General Education credit: Civilization and Culture.

147B. European Intellectual History, 1870-1920 (4) II. Sailer
   Lecture—3 hours; term paper. Cultural and intellectual watershed, 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.
   General Education credit: Civilization and Culture.

147C. European Intellectual History, 1920-1970 (4) III. Sailer
   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, Woffz and de Beauvoir. General Education credit: Civilization and Culture.

148A. Women and Society in Europe: 1500-1799 (4) Kudlick
   Lecture—3 hours; term paper. Prerequisite: course 4B recommended. Roles and perceptions of women from the Reformation 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.

148B. Women and Society in Europe: 1799-1920 (4) 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 France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework.

151A. England: The Middle Ages (4) Justice
   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.

151B. England: The Early Modern Centuries (4) II. The Staff
   Lecture—3 hours; term paper. Prerequisite: courses 4A, 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 gentility and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton.

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.

151D. Industrial England (4) III. Landau
   Lecture—3 hours; term paper. English history from Waterloo to the Battle of Britain; the rise and culmination of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Beveridge, empire to commonwealth.

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. General Education credit: Civilization and Culture.

161B. Latin American History (4) II. 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.

*162. History of the Andean Region (4) III. Lower
   Lecture/discussion—3 hours; written and 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.

163A. History of Brazil (4) III. The Staff
   Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1868. Offered in alternate years.

163B. History of Brazil (4) II. The Staff
   Lecture—3 hours; written reports. The history of the Brazilian republic from 1868 to the present. Offered in alternate years.

164. History of Chile (4) II. Bauer
   Lecture—3 hours; written reports. Major social upheavals since 1800 in selected Latin American nations; similarities and differences in cause, course, and consequence. General Education credit: Contemporary Society.

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.

166B. History of Mexico Since 1848 (4) III. The Staff
   Lecture/discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in alternate years.

168W. History of Inter-American Relations (4) I. 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.

169A. Mexican-American History (4) I. The Staff
   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. General Education credit: Civilization and Culture.

169B. Mexican-American History (4) II. The Staff
   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. General Education credit: Civilization and Culture.

170A. Colonial America (4) II. Jacobson
   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.

170B. The American Revolution (4) III. Jacobson
   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.

170C. The Early National Period, 1789-1815 (4) III. Jacobson
   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.

171A. The Jacksonian Era (4) I. Marchand
   Lecture—3 hours; Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850.

   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).

174A. The Emergence of Modern America, 1876-1914 (4) I. Marchand
   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.

174B. America in War, Prosperity and Depression, 1914-1945 (4) II. Marchand
   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.

174C. The United States since World War II, 1945 to the Present (4) I. The Staff
   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, feminism and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority.

174D. Selected Themes in Twentieth-Century American History (4) II. The Staff
   Lecture—3 hours; term paper. Prerequisite: course 178 or the equivalent or consent of instructor. Interpretive overview of a single topic in twentieth-century America with emphasis on the phases and processes of historical change.

175A. Intellectual History of the United States (4)
   I. 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. General Education credit: Civilization and Culture.

*Course not offered this academic year.
175A. Intellectual History of the United States (4) II. The Staff Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A or 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 1830s to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

175C. Intellectual History of the United States (4) III. The Staff Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A or 17B or the equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Nineteenth-century American thought from about 1820 to the 1860s, emphasizing pragmatism, liberalism, naturalism, and social fact, pragmatism and neo-orthodoxy, Freudian currents in social thought and social criticism of the 1960s.

175A. Cultural and Social History of the United States (4) II. Halltussen Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth century with emphasis on the intersection of work and leisure, socialization, and the family, social reform movements and changes in cultural values.

175B. Cultural and Social History of the United States (4) II. Halltussen Lecture—3 hours; term paper. Study of cultural and social forces in American society in the twentieth century with emphasis on the intersection of work and leisure, socialization, and the family, social reform movements and changes in cultural values.

177A. History of Black People and American Race Relations (4) II. Walker Lecture—3 hours; term paper. Prerequisite: course 17A or 17B. Afro-American history, history of black people in the United States from the eighteenth century to the present. General Education credit: Civilization and Culture.

177B. History of Black People and American Race Relations (4) II. Walker Lecture—3 hours; term paper. Prerequisite: course 17A or 17B. Afro-American history, history of black people in the United States from the eighteenth century to the present. General Education credit: Civilization and Culture.

180A. Growth of American Politics to 1816 (4) I. Goodman Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to the Revolution, 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.

180B. Growth of American Politics, 1815-1900 (4) II. Goodman Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

180C. Growth of American Politics, 1890 to the Present (4) III. The Staff Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.

181. Religion in American History to 1900 (4) II. Jacobsen 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 the War of 1812 and the Victorian period. Improvement of literacy and voting rights for women.

183A. The Frontier Experience: Trans-Mississippi West (4) II. The Staff Lecture—3 hours; written and/or oral reports. The frontier experience, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormon, mining discovery, and the West during the Civil War.

183B. The Frontier Experience: Trans-Mississippi West (4) II. M. Smith Lecture—3 hours; written and/or oral reports. The frontier experience, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormon, mining discovery, and the West during the Civil War.

185A. History of Science in America (4) I. The Staff Lecture—3 hours; research paper. Study of American scientific institutions and their role in the development of science, and of relationships between science and society from colonial times to present.

185B. History of Technology in America (4) II. M. Smith Lecture—3 hours; research paper. Study of American technology, emphasizing bipartite analysis and historical understanding of technological change, creative processes, institutions, and relationships between technology and society from colonial times to present.

187A. American Business History to the 1880s (4) II. Rothstein Lecture—3 hours; term paper. Changes in the role of entrepreneurs and organizations, and management practices from the colonial period to the 1880s, with emphasis on the development of mercantile capitalism to industrial capitalism, marketing, and financial intermediaries and institutions. Offered in alternate years.

187B. American Business History, 1880 to the Present (4) II. Rothstein Lecture—3 hours; term paper. Changes in the role of entrepreneurs and organizations, and management practices from the 1880s to the present, with emphasis on the development of mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and institutions. Offered in alternate years.

188A. History of Agriculture in the U.S. to 1900 (4) I. Rothstein Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economics, and social institutions. Offered in alternate years. General Education credit: Civilization and Culture.

188B. History of Agriculture in the U.S. since 1900 (4) II. Rothstein Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economics, and social institutions. Offered in alternate years. General Education credit: Contemporary Societies.

189A. History of California (4) I. M. Smith Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission system; the decline of the missions; the development of the California economy; the gold rush; the growth of modern California. Offered in alternate years.

189B. History of California (4) I. M. Smith Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission system; the decline of the missions; the development of the California economy; the gold rush; the growth of modern California. Offered in alternate years.

190A. Late Imperial China: Background to Revolution (4) I. Bossier Lecture—3 hours; discussion—1 hour; two papers. Patterns and problems of Chinese life and society that led to the Chinese Revolution. Offered in alternate years.

190B. The Chinese Revolution (4) II. Bossier Lecture—3 hours; discussion—1 hour; term paper. Analysis of China's cultural and political transformation from Confucianism to Communism. Emphasis on the origins and development of the People's Republic of China, with some attention to its implications for post-Communist culture and politics.

190C. History of the People's Republic of China (4) III. Mann Lecture—3 hours; discussion—1 hour; two papers. Cultural and political developments since the founding of the People's Republic of China, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Offered in alternate years.

191A. Classical China (4) I. Price Lecture—3 hours; two papers. The 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.

191B. High imperial China (4) II. Price Lecture—3 hours; two papers. Political disruption and the influx of Buddhism: reunification under the great dynasties of Tang, Sung, and Ming with analysis of society, culture, and thought.

191C. Late Imperial China (4) I. Mann Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A, or upper division standing. Patterns and problems of Chinese life through the Ming and Ch'ing dynasties (1500-1800), prior to the confrontation with the West in the Opium War. Includes primary sources and novels portraying elite culture as well as popular culture. Offered in alternate years.

191D. Nineteenth Century China: The Empire Confronts the West (4) I. Bossier Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A, or upper division standing. The decline and fall of the Qing dynasty, with particular attention to the causes of the Opium War and the Chinese response to the threat of Western imperialism.

192. Internship in History (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of internships, 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.)

193. History of the People's Republic of China, 1949 to the Present (4) II. Mann Lecture—2 hours; discussion—1 hour; term paper. Comprehensive analysis of the political and economic development of China since 1949, with particular emphasis on the Cultural Revolution, the post-Mao era, and China's foreign relations since 1949 to the present. Offered in alternate years.

194A. Aristocratic and Feudal Japan (4) II. Bergen Lecture—3 hours; two papers. Prerequisite: course 9A, or upper division standing. Patterns and problems of Japanese history from the seventeenth century through the late nineteenth century. Emphasis on the development of samurai culture and the influence of European expansion on Japanese society and politics.

194B. Early Modern Japan (4) III. The Staff Lecture—3 hours; term paper and/or discussion. Surveys the cultural, social, economic, and political aspects of Japanese history from the fifteenth to the eighteenth century. Emphasis on the development of samurai culture and the influence of European expansion on Japanese society and politics.

194C. Modern Japan (4) I. The Staff Lecture—3 hours; term paper and/or discussion. Surveys the cultural, social, economic, and political aspects of Japanese history from the twentieth century, with particular emphasis on the development of modern Japanese society and the influence of European expansion on Japanese society and politics.
**History and Philosophy of Science**

*(College of Letters and Science)*

James R. Griesemer, Ph.D., Program Director

Program Office, 409 Surge IV (616-752-9241)

**Course not offered this academic year.**

---

**196. Modern India (4) II. Metcalfe**

Lecture—3 hours; discussion—1 hour. Written reports. Survey of cultural, social, economic, and political aspects of South Asian history from the eighteenth century to the present. Offered in alternate years.

**201. Ancient History (4) II. Seminar**

Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. Seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

**202. Medieval History (4) II. Bowsky**

Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

**203. Russian History (4)**

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1860.

**204. Modern European History (4) II. Hage**

Seminar—3 hours. Prerequisite: course 201. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.

**205. Latin American History (4) II. III. Bauer**

Seminar—3 hours. Prerequisite: two courses in Latin American history or reading knowledge of Spanish or Portuguese.

**273A-273B. Research Seminar in the Comparative History of Women and the Family (4-4) 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 the field. (Deferred grading only, pending completion of sequence.)

**292. College Teaching Internship (4) II. III. The Staff**

Internship—4 hours. Prerequisite: completion of 300 (may be taken concurrently). Student practices in teaching at the 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**

Group Study—1-5 hours. (S/U grading only.)

**299. Research (1-12) II. III. The Staff**

Research—1-12 hours. (S/U grading only.)

**90D. Individual Study (1-12) I. II. III. The Staff**

Individual Study—1-12 hours. (S/U grading only.)

**Professions Courses**

**300. Teaching History in the Community College (3)**

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.)

**398. Introductory Seminar for Teaching Assistants (1) II. III. The Staff**

Seminar—1 hour. Prerequisite: must be enrolled in History 398. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.)

**399. Teaching History in College (2)**

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.)

---

**Committee in Charge**

Betty Jo T. Dobbs, Ph.D. (History)
Michael R. Dietrich, Ph.D. (History and Philosophy of Science)
Paula E. Findlay, Ph.D. (History)
James R. Griesemer, Ph.D. (Philosophy)
Michael Smith, Ph.D. (History)
Paula Teller, Ph.D. (Philosophy)

The Program. The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in the fields of scientific disciplines, and to explore new and fundamental approaches to science and how they have evolved. The minor is sponsored by the Program in the History and Philosophy of Science.

**Minor Program Requirements:**

**History and Philosophy of Science:**

- **104. History 135A or 135B:** 4
- **Four courses from those listed below:** 16
- **One course from:**
  - (a) history
  - (b) philosophy
  - (c) history and philosophy of science
  - **16**
- **History 102, 136, 139A, 139B, 155A, 155B, 156A, 156B:** 16
- **Philosophy 108, 109, 109A, 110, 110:** 11
- **History and Philosophy of Science 130A, 130B, 150, 180:** 15

**Minor advisor:** M. Dietrich, 215 Surge IV, 516-752-3709.

**Courses in History and Philosophy of Science (HPS):**

**Lower Division Course**

  - (a) Dobbs
  - Lecture/discussion—3 hours; term paper. Basic discussion of cosmogonies and cosmologies from several sects, religions, and cultures. Development of Western culture that produced the cosmogonies of Plato, Newton, and Einstein; also cosmological theories of alchemists, alchemists, and other ancient thinkers. General Education credit: Civilization and Culture.

**Upper Division Courses**

- **135A. From Natural History to the History of Nature (4)**
  - (a) Findlay
  - Lecture/discussion—3 hours; term paper. Prerequisite: course 135A recommended. Development of modern biology from pre-Darwinian roots to the present. Considered are the development of modern biology, especially of cellular and molecular biology, General Education credit: Civilization and Culture.

- **135B. History of Modern Biology (4)**
  - (a) Dietrich
  - Lecture/discussion—3 hours; term paper. Prerequisite: course 135A recommended. Development of modern biology from pre-Darwinian roots to the present. Considered are the development of modern biology, especially of cellular and molecular biology, General Education credit: Civilization and Culture.

- **150. Gender and Science (4)**
  - (a) Dietrich
  - Lecture/discussion—3 hours; term paper. A seminar in the history and philosophy of science that examines the relationships between gender and science. Topics include the historical and cultural construction of gender differences, the role of women in the development of science, and the impact of science on gender roles.

- **160. Topics in History and Philosophy of Science and Technology (4)**
  - (a) Staff
  - Lecture—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or another course in a related field.
Human Development

See Cell Biology and Human Anatomy in Medicine, School of

Human Anatomy

(Human Development)

(College of Agricultural and Environmental Sciences)

L. V. Harper, Ph.D., Chairperson of the Division

Faculty

Curtis R. Acocado, Ph.D., Adjunct Associate Professor
Carolyn H. Aldwin, Ph.D., Associate Professor
Keith Barlow, Ph.D., Professor
Brenda Bryant, Ph.D., Professor
James Chisholm, Ph.D., Associate Professor
Lawrence Harper, Ph.D., Professor
Rosemarie Kraft, Ph.D., Associate Professor
Beth Ober, Ph.D., Assistant Professor
Carol Rodning, Ph.D., Assistant Professor
Emmy Werner, Ph.D., Professor

Emeriti Faculty

Louise Bachrath, Ed.D., Professor Emeritus
Glenn Hawks, Ph.D., Professor Emeritus
David Lynn, Ph.D., Professor Emeritus

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, and human development. Upper division students plan their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the biological and social 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 requirement for the major. In addition, students can intern in schools, early childhood education centers, hospitals, rehabilitation centers, recreation offices, group foster homes, mental health clinics, or as tutors for handicapped and bilingual students. Human development graduates fill a wide variety of positions in preschools, elementary and special education settings, as well as governmental and social welfare and recreation. Those who emphasize the biological aspect of human development can apply to medical school or computational science for para-medical positions within the health sciences. Human development prepares students to pursue advanced degrees in the behavioral sciences, education, guidance, counseling, social work, mental health, or further research in the human development field. Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree 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. Equivalents or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

English Composition Requirement……………………………………………10-12
See College requirement………………………………………………………..0-6
Additional English (choose from English 102, 103, 104)…………………..3-4

Preparatory Subject Matter……………………………………………………38-44
Anthropology 1, 2, and 15…………………………………………………………..13
Biological sciences (biological sciences 1A or 1B)………………………………4-5
† Chemistry 2A is recommended prerequisite for Biological Sciences 1A. Biological sciences 1A is prerequisite for Biological Sciences 1B.
Genetics (Genetics 10 or 100)…………………………………………………….4
Human development (Human Development 10)………………………………5
Nutrition (Nutrition 10 or 101)……………………………………………………3-5
Physiology (Physiology 1 or 110)…………………………………………………3-5
Psychology (Psychology 1 or 110)………………………………………………..3-4
Statistics (Education 114, Psychology 111, Sociology 49B, or Statistics 13)………………………………………………………………………………..4

Breadth/General Education Requirement………………………………………14-32
Satisfaction of General Education requirement……………………………….9-24
American history/american government (history 17A, 17B, 17C, 72A, 72B, and Political Science 1 are recommended courses)………………...8

Depth Subject Matter……………………………………………………………52
Human development (Human Development 10A or 10B)………………………110
Social-cultural processes (Human development 10 or 103)……………………4
Assessment (Human Development 10 or 121)…………………………………...4
Cognitive processes (Human development 10 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 or from a list of restricted electives (in consultation with faculty advisor)………………...16

Unrestricted Electives……………………………………………………………..39-66
Total Units for the Degree………………………………………………………180

Major Adviser. K. Baron, L. Harper.

Related Major Program. See the major in Applied Behavioral Sciences.

Minor Program Requirements:

UNITS

Aging and Adult Development…………………………………………………21-27
Human development 100C, 100, 191………………………………………………..5
Community Health 180……………………………………………………………3
Human development 110, Applied Behavioral Sciences 175, 176, 192, 193………………………………………………………………………………...8
Practicum: 2 units minimum……………………………………………………...2-4
Minor Adviser. C. Aldwin, B. Ober.

UNITS

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. L. Harper.

Graduate Study. Refer to the Graduate Studies section in this catalog.

Courses in Human Development

Human Development 202-300

HED 202. Introduction to Human Development

HED 203. Human Development and Behavioral Science

HED 204. Human Development and Social Science

HED 205. Human Development and Health Science

HED 206. Human Development and Education

HED 207. Human Development and Psychology

HED 208. Human Development and Sociology

HED 209. Human Development and Anthropology

HED 210. Human Development and Economics

HED 211. Human Development and Geography

HED 212. Human Development and History

HED 213. Human Development and Government

HED 214. Human Development and Law

HED 215. Human Development and Psychology

HED 216. Human Development and Sociology

HED 217. Human Development and Anthropology

HED 218. Human Development and Economics

HED 219. Human Development and Geography

HED 220. Human Development and History

HED 221. Human Development and Government

HED 222. Human Development and Law

HED 223. Human Development and Psychology

HED 224. Human Development and Sociology

HED 225. Human Development and Anthropology

HED 226. Human Development and Economics

HED 227. Human Development and Geography

HED 228. Human Development and History

HED 229. Human Development and Government

HED 230. Human Development and Law

HED 231. Human Development and Psychology

HED 232. Human Development and Sociology

HED 233. Human Development and Anthropology

HED 234. Human Development and Economics

HED 235. Human Development and Geography

HED 236. Human Development and History

HED 237. Human Development and Government

HED 238. Human Development and Law

HED 239. Human Development and Psychology

HED 240. Human Development and Sociology

HED 241. Human Development and Anthropology

HED 242. Human Development and Economics

HED 243. Human Development and Geography

HED 244. Human Development and History

HED 245. Human Development and Government

HED 246. Human Development and Law

HED 247. Human Development and Psychology

HED 248. Human Development and Sociology

HED 249. Human Development and Anthropology

HED 250. Human Development and Economics

HED 251. Human Development and Geography

HED 252. Human Development and History

HED 253. Human Development and Government

HED 254. Human Development and Law

HED 255. Human Development and Psychology

HED 256. Human Development and Sociology

HED 257. Human Development and Anthropology

HED 258. Human Development and Economics

HED 259. Human Development and Geography

HED 260. Human Development and History

HED 261. Human Development and Government

HED 262. Human Development and Law

HED 263. Human Development and Psychology

HED 264. Human Development and Sociology

HED 265. Human Development and Anthropology

HED 266. Human Development and Economics

HED 267. Human Development and Geography

HED 268. Human Development and History

HED 269. Human Development and Government

HED 270. Human Development and Law

HED 271. Human Development and Psychology

HED 272. Human Development and Sociology

HED 273. Human Development and Anthropology

HED 274. Human Development and Economics

HED 275. Human Development and Geography

HED 276. Human Development and History

HED 277. Human Development and Government

HED 278. Human Development and Law

HED 279. Human Development and Psychology

HED 280. Human Development and Sociology

HED 281. Human Development and Anthropology

HED 282. Human Development and Economics

HED 283. Human Development and Geography

HED 284. Human Development and History

HED 285. Human Development and Government

HED 286. Human Development and Law

HED 287. Human Development and Psychology

HED 288. Human Development and Sociology

HED 289. Human Development and Anthropology

HED 290. Human Development and Economics

HED 291. Human Development and Geography

HED 292. Human Development and History

HED 293. Human Development and Government

HED 294. Human Development and Law

HED 295. Human Development and Psychology

HED 296. Human Development and Sociology

HED 297. Human Development and Anthropology

HED 298. Human Development and Economics

HED 299. Human Development and Geography

HED 300. Human Development and History
120. Research Methods in Human Development (4) J. Barton Lecture—3 hours; laboratory/discussion—1 hour. Prerequisites: courses 100A and 100B, elementary statistics. Research methods in selected areas of human development, including infancy, learning, cognition, personality.  

121. Psychological Assessment (4) I. Barton; II. The Staff Lecture—4 hours. Prerequisites: courses 100A and 100B, elementary statistics. Overview of psychological assessment with children.  

130. Emotionally Disturbed Children (4) J. Bryant Lecture—3 hours; discussion—1 hour. Prerequisites: courses 100A and 100B or consent of instructor. Discussion of child behavior disorders and learning difficulties in children.  

131. Developmental Disabilities (4) I. Kraft 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. The Staff Lecture—3 hours; discussion—1 hour. Prerequisites: courses 100A and 100B or consent of instructor. Conceptualization, identification and education of the child prodigy, gifted and talented, gifted individual.  

140. Laboratory in Early Childhood (3-6) III, III. Stockman Discussion—1 hour; laboratory—6-12 hours. Prerequisite: course 100A and 100B or consent of instructor. Application of theories of learning and development to interaction with young children. Manipulative, child-centered approaches, awareness of goals, beliefs, and values as they affect interactions. Students must register for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.  

140L. Laboratory in Early Childhood (3-6) III, II, III. Stockman Discussion—1 hour; laboratory—6-12 hours. Prerequisite: course 100A and 100B or consent of instructor. Application of theories of learning and development to interaction with young children. Manipulative, child-centered approaches, awareness of goals, beliefs, and values as they affect interactions. Students must register for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.  

141. Field Studies with Children and Adolescents (4-6) II. The Staff; III. Kraft Lecture—2 hours; field study—6-12 hours. Prerequisites: 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 disturbed, or intellectually gifted. 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 hour; field study—6-12 hours. Prerequisites: one of the following: 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 disturbed, 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) II. Alwine Fieldwork—6-12 hours; discussion—1 hour. Prerequisites: courses 100A and 100B or one of the following: 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 disturbed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.  

150. Supervision and Administration of Early Childhood Education Programs (4) I. The Staff Lecture—4 hours; laboratory—6 hours. Prerequisites: one of the following: 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 disturbed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.  

*Course not offered this academic year.
and the development of attachment. Other possible topics include infant temperament, sex differences, compliance, and self-regulation. Offered in alternate years.

203. Development in Middle Childhood (3) II. Bryant Lecture—3 hours. Prerequisite: graduate standing; some background in developmental psychology or human development; consent of instructor. Critical evaluation of current theory and research regarding normal and "atypical" development in middle childhood. Emphasizes social-emotional development in varying contexts (family, school, neighborhood) and considers the interplay of cognitive, biological, social, and emotional processes during middle childhood. 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) III. Harper Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for understanding developmental psychology; consideration of parallels between processes of organismic development and behavioral development in children and intra-human mammals.

212. Adaptation and Aging (3) I. Aldwin Lecture/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) III. Politi 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 concerning 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 Latency (3) II. 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 cognitive and perceptual latency; 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. Barton 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.

225. Behavioral Development and Food Intake (4) III. Politi 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) III. 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) I. 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. The Staff 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, child rearing 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.

241. Consultation Approaches to Child Development (3) I. 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.

246. Sex, Evolution, and Development (4) I. Chisholm Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development or related field. An evolutionary and cross-cultural perspective on the family, with special emphasis on life history theory and parental investment theory and their relevance for understanding the development of alternative mating and parenting strategies in humans.

290. 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 conferences with graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (SU grading only.)

291. Research Issues in Human Development (3) I. Kraft; II. Werner Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in specific areas of behavioral development.

296. Group Study (1-5) III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Hydrologic Sciences (A Graduate Group)

Mark E. Grimmer, Ph.D., Chairperson of the Group
Group Office, 115 Vollmeyer Hall (916-752-3243/3453)
Faculty. The Group consists of faculty members from the Departments of Civil and Environmental Engineering; Environmental Studies; Geography; Geology; and Land, Air and Water Resources.

Graduate Study. The Graduate Group in Hydrologic Sciences is a unique interdisciplinary program offering M.S. and Ph.D. degrees. Education in the Group is designed to broaden the skills and knowledge of the physical sciences or engineering student interested in the occurrence, distribution, circulation and properties of water on earth. Because of water's ubiquity and importance to physical, chemical and biological processes, Hydrologic Sciences involves the geologic, atmospheric and oceanic sciences, as well as engineering and other physical sciences. Basic to the Hydrologic Sciences program is a core curriculum of courses in fluid dynamics, hydrologic phenomena, hydrobiology, hydrogeochemistry, hydrologic techniques, and hydrologic policy. The program has three degree options including Hydrobiology, Hydrogeology (Hydrogeology) and Hydrochemistry.
Preparation. Applicants to the program are expected to have completed an undergraduate degree in some aspect of the physical sciences, mathematics, or engineering. Undergraduate study must include one year of calculus, one year of physics with calculus, and one year of geology and one year of chemistry. Additional courses in advanced mathematics, applied statistics, and computer programming 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.


Courses in Hydrologic Sciences (HYS)

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 diversities of subjects involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. (SU grading only.)

201. Earth Science and Resources (3) II. Moores (Geology) Seminar—3 hours. Prerequisite: Physics 95, Mathematics 22C, Chemistry 4C or consent of instructor. Advanced survey of the earth's structure and processes. Internal structure and plate tectonics. Principles of mineralogy and petrology. Igneous, and metamorphic processes. Sedimentation and stratigraphy. Deformation and structural style. Energy, ore and water resources. Graduate students in Geology may enroll only with consent of instructor.


215. Advanced Topics in Water and Soil Chemistry (3) III. The Staff Lecture—3 hours. Prerequisite: a course in physical chemistry and soil chemistry or consent of instructor. Advanced course in water chemistry, emphasizing principles governing interactions of ionic constituents in water with sediment and soils. Topics include electrokinetic properties of clays, membrane phenomenon, rate processes and thermodynamic applications to the water soil systems. Not open for credit to students who have completed Water Science 215. Offered in alternate years.


222. The Biology of Streams (5) III. Knight Discussion—2 hours; seminar—1 hour; laboratory—6 hours per semester. Prerequisite: courses in aquatic entomology, ichnology, and physiology. Course will relate various environmental factors to the ecology and productivity of flowing freshwater systems. Emphasis is placed on relationships between stream organisms and their environment by means of integrated field and lecture activities. Offered in alternate years.

230. 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. 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. Empirical process models and hydrochemical modeling; introduction to systems level models. Not open for credit to students who have completed Water Science 217.

240. Multi-phase Transport in Soils (3) III. Grismer Lecture—3 hours. Prerequisite: Engineering 13, Civil and Environmental Engineering 141, or Water Science 142. Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrainment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years.

254. Modeling of Hydrologic Processes (3) III. Puente Lecture—3 hours. Prerequisite: Water Science 141 or the equivalent and Statistics 102 or the equivalent. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Process studies include those based on stochastic point process, change theory, fractal geometry, and fractional noises. Offered in alternate years.

255. Analysis of Spatial Processes (3) III. Puente Lecture—3 hours. Prerequisite: Statistics 102 or the equivalent. Hydrologic Sciences 230 or Statistics 237A recommended. Examination of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical applications. Offered in alternate years.

290. Seminar (1) II. Knight Seminar—1 hour. Prerequisite: graduate standing. Critical review of relevant water quality problems and recent water quality research and literature.

291. Seminar in Water-Soil-Plant Relations and Irrigation (1) II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing and background in water-soil-plant relations. Informal presentation on current developments in water-soil-plant relations, plant water use, and irrigation management. Associated discussion analyzes research approaches and techniques and data interpretations. (SU grading only.)

297. Seminar in Hydrologic Sciences (3) III. The Staff Seminar—3 hours. Prerequisite: graduate standing; consent of instructor. Seminar on current area of research in hydrologic sciences. Topic will change from year to year. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

*Course not offered this academic year.
Independent Study Program

Information:
Chairperson:
Committee on Courses of Instruction
Office of Academic Senate Office (916-752-2231)
The Independent Study Program provides an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest. A qualifying 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 the student undertakes during the Independent study quarter. Regularly offered formal courses will only be acceptable as 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 end of the second week of the term prior to 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.

Breadth/General Education........................................6-24
Satisfaction of General Education requirement.

Depth Subject Matter........................................45-54
Upper division coursework must include:
a) related coursework from two or more campus departments focused on a single educationally coherent area;
b) at least 30 units must be taken from courses provided by the College of Agricultural and Environmental Sciences.
Note: the completed proposal should be submitted to the Individual Major Committee at least four quarters before graduation; otherwise, graduation may be delayed.

Unrestricted Electives...........................................(variable)
Total Units for the Degree......................................180

Master Advisers:
G.C. Martin (Romany). The individual major proposal may be developed in consultation with the Academic Advising Center and two or more faculty members prior to final review by the Individual Major Committee for the College.

College of Letters and Science
Program Office, 150 Mrak Hall (Dean's Office), (916-752-0052)

Committee in Charge
David Barsky, Ph.D. (Mathematics)
Arnold Silman, Ph.D. (Neurobiology, Physiology and Behavior)
Robert M. Murphey, Ph.D., Chair (Psychology)
Peter M. Schaeffer, Ph.D. (German and Russian)
Marian Ung, Ph.D. (Comparative Literature)
Diane Wolf, Ph.D. (Sociology)

A.B. and B.S. Major Requirements:

Preparatory Subject Matter...........................................
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter........................................45-54
Upper division units must include:
a) related coursework from two or more departments which provide a unified pattern and focus;
b) at least 30 units from Letters and Science teaching departments of programs;
c) no more than 10 units in courses numbered 194H, 198 and 199;
d) for the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

Total Units for Degree..........................................180

Student Proposal. A student submits to the Dean's Office a major proposal and an essay, discussing educational purposes, personal and/or professional objectives, along with faculty letters of recommendation. After initial review, the Faculty Committee on Individual Majors evaluates the proposal and provides final action.

Major Advisers (selected by student):
Principal Adviser: a faculty member in the teaching department or program in the College of Letters and Science in that major field of emphasis. Secondary Adviser: a faculty member from secondary area of interest.

Honors Program. Toward the end 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.

*Course not offered this academic year.

Integrated Studies

Integrated Studies (College of Letters and Science)
Nora A. McGinniss, Ph.D., Program Director
Office, 186 Sprague Hall (916-752-3377)

Committee in Charge
Richard T. Curley, Ph.D. (Anthropology)
Kurt Kreith, Ph.D. (Mathematics)
Nora A. McGinniss, Ph.D. (Integrated Studies)
Jay Meckling, Ph.D. (American Studies)
Kenneth L. Verosub, Ph.D. (Geology)
Daniel L. Wick, Ph.D. (Integrated Studies)

Faculty
Richard T. Curley, Ph.D., Associate Professor (Anthropology)
Dennis Dingemans, Ph.D., Associate Professor (Geography)
Bruce M. Hackett, Ph.D., Associate Professor (Sociology)
Kurt Kreith, Ph.D., Professor (Mathematics)
Jerald L. Lath, Ph.D., Professor (Internal Medicine, Biological Chemistry)
Douglas McColl, Ph.D., Professor (Physics)
Nora A. McGinniss, Ph.D., Lecturer (Integrative Studies)
Jay Meckling, Ph.D., Professor (American Studies)
Kenneth L. Verosub, Ph.D., Professor (Geology)
Daniel L. Wick, Ph.D., Lecturer (Integrative Studies)

The Program of Study

Integrated Studies is an optional freshman Honors residential program offering specially designed courses in humanities, natural sciences, and social sciences. The program encourages cross-disciplinary interests in its faculty and students. It values close contact between student and professor, both in the classroom and in the residence hall. Integrated Studies courses fulfill college breadth requirements and lower division General Education requirements. Enrollment is limited. In 1993-94, 60 students will be admitted to the program. Class sizes are limited to 25.

Students enroll in at least three Integrated Studies courses during the year. Students not admitted to the Program may not register for Integrated Studies courses.

Coursed in Integrated Studies (IST)

Lower Division Courses

1A. Nature and the Environment: Physics (4) III.
McColl
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. General Education Credit: Nature and Environment.

1B. Nature and the Environment: Origins of the Universe (4) I. The Staff
Lecture: 3 hours; discussion: 1 hour. Knowledge of the origins of the universe, matter, galaxies, stars, and planets, and of the earth and the variety of life forms that have evolved on this planet. General Education Credit: Nature and Environment.
International Agricultural Development

(College of Agricultural and Environmental Sciences)

The Major Program

The goal of international agricultural development is to improve food production, nutrition, marketing, and health in less technologically 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 should 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 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 governmental or private agencies 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

English Composition Requirement.........................0-8

Preparatory Subject Matter.................................42-48

(Choose either Social Sciences or Natural Science core)

Social Sciences core

Chemistry (Chemistry 10)..................4

Science (Biological Sciences 10, Plant Science 2, Animal Science 1, Nutrition 10, Soil Science 10)..................10

Social sciences (Upper Behavioral Sciences 1, Anthropology 2)..................16

Statistics (Agricultural Science and Management 150 or Sociology 13 or Sociology 46)..................3-4

Natural Science core

Biological sciences (Animal Science 2, Biological Sciences 1A, 1B, 1C, Genetics 100, Plant Science 2)..................15

Chemistry (Chemistry 2A, 2B, 8A, 8B)..................16

Mathematics (Mathematics 16A or 21A)..................3-4

Physics (Physics 6A)..................4

Statistics (Agricultural Science and Management 150 or Computer Science Engineering 10)..................3

Breath/Breadth Education Requirement..................6-24

Depth Subject Matter............................................9

International Agricultural Development 10, 110, 111

International agricultural development (International Agricultural Development 101, 102, 103, 141, 190, 191, 195, 198)..................12

Economics and social sciences: Economics 1A-1B and two upper division courses relevant to development (Agricultural Economics 100A, 100B, 106, 113 or 136, 115A-115B, 140, 145, 147, 193, 176, Economics 100, 105, 110A, 115A, 115B, 118, Anthropology 128, 131, 135; Applied Behavioral Science 153; Political Science 166, 144A-144B; Sociology 144, 145)..................18

Primary Field of Specialization................................60

Natural Sciences or Social Sciences: Courses chosen by student, with an advisor in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.

Natural Sciences: Students 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 and 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

*Course not offered this academic year.
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.


Minor Program Requirements:

1. International Agricultural Development
   - 16 units
   - Minimum of four units chosen from Interna-
tional Agricultural Development 101, 102, 110, 111.
   - 101, 102, 110, 111 minimum.

   Minor Adviser: S. B. Brush (1361 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.), Room 112, 12214 University Center.

Graduate Advisers. S.B. Brush, (Applied Behavioral Sciences); D. J. Boyd (Anthropology); K. G. Casman (Agriculture and Range Science); L. S. Jarvis (Agricultural Economics).

Related Courses. See Agricultural Economics 148, 215C, Agronomy 111; Animal Science 160; Anthropology 221; Economics 115A-115B, 118, 215A-215B, 215C; Geography 142; Nutrition 20; Sociology 144; Vegetable Crops 150.

Courses in International Agricultural Development (IAD)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center in Hart Hall (916-752-2224).

Lower Division Courses
10. Introduction to International Agricultural Development (4). I. The Staff
   - Lecture—4 hours. Prerequisite: General Education or consent of instructor.
   - Course: consent of instructor. Supervised internship, off campus.

Upper Division Courses
101. Tropical Crop Agriculture (4). II. The Staff
   - Lecture—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C, and Soil Science 100 or Agronomy 100. Environment and management factors affecting plant agriculture through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. General Education credit: Contemporary Societies.

92. Internship (1-12). I, II, III. The Staff (Chairperson in charge)
   - Internship—3–6 credit hours. Prerequisite: consent of instructor. Supervised internship, off and on campus.

102. Limited Resource Animal Agriculture (4). III.
   - Brown (Animal Sciences)
   - Lecture—3 hours; laboratory—3 hours; one-all day Saturday field trip required. Prerequisite: Animal Science 20. Economically and ecologically sound methods are presented to meet objectives of limited resource animal agriculture system. Range systems, small farms, third world systems and suburban enterprises are considered. (Same course as Animal Sciences 102).

103. Social Change and Agricultural Development (4). III. The Staff
   - Lecture/discussion—4 hours. Prerequisite: introductory sociology course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change and implementation strategies; recent emphasis on self-help, diffusion of innovations; social impact analysis and technology assessment. Offered in alternate years.

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 is given to 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 (Economics 1A). Economic analysis of agricultural marketing systems in low income countries, including the functions of transportation, storage, packaging, grading and standardization, processing, and market news. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

141. Technology for Agriculture in Developing Regions (3). I. Chaney (Agricultural Engineering)
   - Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture. Man, animal, and engine-powered devices. Energy requirements, size, scale, costs, support infrastructure development, and productivity potentials. (Same course as Applied Biological Systems Technology 141).

190. Proseminar in International Agricultural Development (1). I, II, III. The Staff
   - Seminar—1 hour. Preparation 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—3–6 credit hours. Prerequisite: consent of instructor. Supervised internship, off and on campus.

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
   - Lecture—3 hours. Emphasis on course 101; Agricultural Science 100A. Economic perspective on small farm development. Establishes a basis for preventing farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare.

201. The Economics of Small Farms and Farming Systems (4). II. Jarvis
   - Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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.

   - Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in economic development, cultural anthropology, sociology, or political science (especially comparative political economy 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.

   - 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 activities; processes and structures of implementation; delegation, decentralization, devolution, deconcentration, and dispersal.

220. Food and Nutrition Strategies in Developing Countries (4). I+IL. Jarvis
   - Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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. (S/U grading only.)

291. Topics in International Agricultural Development (1-3). I, II, III. The Staff
   - Lecture—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.

292. Graduate Internship (1-12). I, II, III. The Staff
   - Internship—3–6 credit 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. (SU only grading.)

298. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge)
   - (SU only grading.)

299. Research (1-12). I, II, III. The Staff (Graduate Group Chairperson in charge)
   - (SU only grading.)

International Agricultural Development

(A Graduate Group)

Steven R. Temple, Ph.D., Chairperson of the Graduate Group Office, 1303 Hart Hall (916-752-1928)
Faculty. The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development. Many of its faculty members have had international experience in 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 thorough knowledge of technological, social, economic, and political variables that affect 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 environmental interests in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate.

Graduate Adviser. Contact the Group Office.

---

**International Relations**

(College of Letters and Science)

Miroslav Nincic, Ph.D., Program Director

Program Office, 351 Voorhis Hall (916-752-3063)

**Committee in Charge**

Larry Berman, Ph.D. (Political Science)
Michael R. Caputo, Ph.D. (Agricultural Economics)
Dennis J. Dingemans, Ph.D. (Geography)
Yuri Druzhnikov, Ph.D. (Russian)
Emily G. Goldman, Ph.D. (Political Science)
Michèle Pranger, Ph.D. (French)
Richard Sinopoli, Ph.D., (Political Science)
Janet S. Smith, Ph.D. (Anthropology)
Michael Smith, Ph.D. (Economics)
Wing T. Woo, Ph.D. (Economics)

**The Major Program**

Problems of security, human rights, energy, and mineral resources, 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 has become 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 a core of courses and an economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompass major topical areas in combination with regional emphases. I. World Trade and Development. II. International Relations of the Third World. III. Global Resources and Environment, IV. World Politics. 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 experiences into the life and culture of other countries. At UC Davis, the internship program assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center arranges summer internships in Washington, D.C. Internships for graduates are provided for employment in governmental agencies abroad (such as the Foreign Service), with state agencies, international or non-governmental organizations (such as the United Nations), 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.

**Preparatory requirements.** Before declaring a major in International Relations, students must complete the following courses with a combined grade point average of at least 2.50 (all courses must be taken for letter grade).

- Economics 1A, 1B: 10 units
- Geography 10: 3 units
- History 4C: 4 units
- Political Science 3: 3 units

**A.B. Major Requirements:**

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-55</td>
<td>Economics 1A, 1B</td>
</tr>
<tr>
<td>3</td>
<td>Political Science 3</td>
</tr>
<tr>
<td>3</td>
<td>Geography 10</td>
</tr>
<tr>
<td>4</td>
<td>History 4C</td>
</tr>
<tr>
<td>3-4</td>
<td>One course selected from Anthropology 2, Environmental Studies 30, Geography 2, History 4B, 4A, 4B, 10, 15, 17C, International Agricultural Development 10, Political Science 1, 2</td>
</tr>
<tr>
<td>0-30</td>
<td>Approximately 24 to 30 units (or the equivalent) in one modern foreign language (see adviser for details)</td>
</tr>
<tr>
<td>13</td>
<td>Recommanded: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)</td>
</tr>
</tbody>
</table>

**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-50</td>
<td>Economics 115A, 115B</td>
</tr>
<tr>
<td>4-8</td>
<td>Economies 160A-160B (Cluster I) or 162 (Clusters II, III, IV)</td>
</tr>
<tr>
<td>0</td>
<td>Clusters I students: not prerequisite for courses 160A-160B</td>
</tr>
<tr>
<td>3</td>
<td>Political Science 123</td>
</tr>
<tr>
<td>3</td>
<td>Cluster emphasis: 32</td>
</tr>
<tr>
<td></td>
<td>Choose one from the four clusters shown below. Courses must be in addition to those applied toward requirements above.</td>
</tr>
</tbody>
</table>

**Total Units for the Major**

| Units | 72-105 |

**Course List for Cluster Emphasis**

**Cluster I: World Trade and Development**

(Heavy economic emphasis; suitable particularly for students who seek careers in international business or international organizations)

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Economics 100 or 104</td>
</tr>
<tr>
<td>4</td>
<td>Economics 101 or 105</td>
</tr>
<tr>
<td>0-16B</td>
<td>Economics 160A-160B</td>
</tr>
<tr>
<td></td>
<td>Economics 160A fulfills one core requirement; Economics 160B fulfills a cluster requirement.</td>
</tr>
<tr>
<td></td>
<td>One course to be selected from: Economics 115A or 115B (whichever course is not used to fulfill the core requirement above).</td>
</tr>
<tr>
<td></td>
<td>Two courses to be selected from: Anthropology 122, 126, 131, 135 Geography 141, 142 Political Science 124, 178 Sociology 133, 141, 144, 145, 146</td>
</tr>
<tr>
<td></td>
<td>Two regional courses from Group A (History)</td>
</tr>
</tbody>
</table>

**Cluster II: International Relations of the Third World**

(Focuses on problems of development of the Third World in recent times)

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Anthropology 123, 124, 126, 127, 131, 135</td>
</tr>
<tr>
<td></td>
<td>Sociology 118, 139, 141, 145A Political Science 124, 126, 127, 128, 178 Economics 110A, 115A or 115B (whichever course is not used to fulfill the core requirement above)</td>
</tr>
<tr>
<td></td>
<td>Four regional courses focused on Third World: Select two courses from Group A (History) Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)</td>
</tr>
</tbody>
</table>

**Cluster III: Global Resources and Environment**

(Designed to familiarize students with major patterns of resource distribution in the world and the role resources play in international affairs)

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Agricultural Economics 147, 176 Economics 123 Environmental Studies 100, 101 Geography 160 Political Science 107 Environmental and Resource Sciences 100</td>
</tr>
<tr>
<td></td>
<td>Two additional courses to be selected from two of the following groups: Energy—Agricultural Economics 175, Geology 130, Political Science 171 Food Resources—Geography 142, 175, Sociology 147 Population—Sociology 170 Rural Development—Anthropology 126, 131, 133, 135 Urbanization—Anthropology 127, Geography 156, Sociology 143A, 145A Water Resources—Geography 162, Geology 116</td>
</tr>
<tr>
<td></td>
<td>Three regional courses: Select two courses from Group A (History) Select one course from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)</td>
</tr>
</tbody>
</table>

**Cluster IV: World Politics**

(Examines political relationships in international relations. The focus is on national governments and their activities in the global political system)

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>One course to be selected from: Political Science 120, 121</td>
</tr>
<tr>
<td></td>
<td>Two courses to be selected from: Economics 116 History 145, 146A, 146B, 147A, 147C Political Science 112, 126, 132, 140, 177, 178 Sociology 119, 157, 165A</td>
</tr>
<tr>
<td></td>
<td>One course to be selected from: Anthropology 123 Geography 143 Politics 118 Sociology 118</td>
</tr>
<tr>
<td></td>
<td>Four regional courses: Select two courses from Group A (History) Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)</td>
</tr>
</tbody>
</table>

**Regional Courses—Group A**

<table>
<thead>
<tr>
<th>Units</th>
<th>Subject Matter</th>
</tr>
</thead>
</table>

**Major Adviser.** M. Nincic (Political Science).
Courses in International Relations (IRE)

Lower Division Courses
98. Directed Group Study (1-5) I, II, III.
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III.
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses
100. 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 a different topic is studied.

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) I, II. Nincic 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 the direction of a faculty adviser. (Deferred grading only, pending completion of course sequence.)

198. Directed Group Study (1-5) I, II, III.
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Internship

See Internship Program below; also UC Davis Washington Center

Internship Program

Lawrence B. Coleman, Ph.D., Director
Joanne B. Shelby, Associate Director
The Internship and Career Center, 2nd Floor, South Hall, (916) 752-3855

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
Donald J. Hagerty, Program Manager

Internship Experience

The Internship and Career Center facilitates a campus-wide internship program. All internships, both credit and non-credit, can be taken for academic credit. Students are required to meet with a faculty member to discuss their internship experience. Questions personal 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 basis. A minimum of 12 units of credit is required for graduation. Students must remain in the department of the sponsoring faculty member and faculty and be involved in Internship and Career Center activities.

Italian

(College of Letters and Science)
JoAnn Cannon, Ph.D., Program Director
Department Office (French and Italian), 515 Sproul Hall (916) 752-0830

Faculty
JoAnn Cannon, Ph.D., Professor
Dennis J. Dutschke, Ph.D., Professor
Gustavo Foscari, M.A., Lecturer
Juliana Schiessari, Ph.D., Associate Professor

The Major and Minor Programs

The major in Italian is intended to provide 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 at all levels and knowledge of the language is required for literature courses which are taught entirely in Italian. The Italian program actively participates in the Education Abroad Program, the International Internships Program, and the Summer Sessions International (Naples), 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 in larger or shorter 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 U.S., and Florence for retail commerce and the arts, 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:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian 1, 2, 3, 4, 5, 6, and 9 (or the equivalent)</td>
<td>0-24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian 101 and 105</td>
<td>36</td>
</tr>
</tbody>
</table>

Upper division courses in literature, taught in the language. Must include at least one course from each of the following literary periods: (a) Early Italian, (b) Renaissance and Baroque, (c) Eighteenth through Twentieth Centuries.

A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields such as history, art, history, and music.

Note: All upper division courses are to be chosen in consultation with the major advisor.

Total Units for the Major: 36-60

Recommended: One year of college Latin or an equivalent.

Major Advisor: G. Foscari

Minor Program Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian 101 and 105</td>
</tr>
</tbody>
</table>

Literature, three courses chosen in consultation with major advisor. (P/NP grading only)

One course chosen from each 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 in literature in translation offered by the Italian Program.)

Prerequisite Credit. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the Program Director.

Honors and Honors Program. The honors program comprises two quarters of study under course 194A, which will include a research paper and a comprehensive examination. See also sections on University and College requirements.

Teaching Credential Subject Representative. See Major Advisor above and also the section on the Teacher Education Program in this catalog.

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. Foscari in charge
Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all major 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. Foscari 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. Foscari in charge
Discussion—5 hours. Prerequisite: course 2. Continuation of course 2, and practice of all language skills through cultural texts.

4. Intermediate Italian (3) I, II, III. Director in charge
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
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 develop student’s ability to read, understand and discuss modern Italian.

8A. Italian Conversation (3) I, II, III. The Staff
Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only)

8B. Italian Conversation (3) I. 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. Direct 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.

25. Italian Literature in Translation (3 II. The Staff (Program Director in charge) Lecture—1 hour, discussion—2 hours. Course intended to acquaint non-majors with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, movements, or special themes.

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. General Education credit: Civilization and Culture.

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) I. 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 materials.

105. Introduction to Italian Literature (4) I. The Staff Lecture—3 hours; weekly essay. 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.

107. Survey of Italian Culture and Institutions (4) III. Fossaroli 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.

109. The Image of Man in the Italian Renaissance (4) III. The Staff Lecture—3 hours; term paper or oral presentation. Prerequisite: course 9 or consent of instructor. Process of progressive naturalization of the concept of man and emphasis upon different perspectives of human autonomy, self-determination and scientific curiosity. (a) Historical and environmental; (b) philosophical view: the adversary evaluation of the concept of Man; (c) prose and poetry. Offered in alternate years.

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 Swell New Style Poets, and other authors. Offered in alternate years.

113. Dante Alighieri, Divine Commedia (Inferno, Purgatorio, Paradiso) (4) III. Dutschke Lecture/discussion—3 hours; term paper—1 hour. Prerequisite: course 9 or consent of instructor. Study of Dante Alighieri's Divine 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.

114. Boccaccio, Decameron, and the Renaissance Novella (4) I. 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 followers. Offered in alternate years.

115A. Studies in the Cinquecento (4) III. Schiessari 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 Ferrante, Ariost, Machiavelli, Aretino, Castiglione, and Tasso. Offered in alternate years.

115B. Italian Literature of the Renaissance and the Baroque: from Celini to Marino (4) III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 115A. Continued exploration into the less of an ideal. Emphasis on Donati's role in the formation of a modern literary standard.

115C. Italian Drama from Machiavelli to the Enlightenment (4) I. Schiessari Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of comic and tragic terms and their ideological and political implications and 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.

115D. Early Modern Italian Lyric (4) I. Schiessari Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Examination of the poet's life and work according to Petrarch. Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Cappuccini, Tasso, Marino, Gasparo Staappa, Veronci Franco, Isabella di Morra. Offered in alternate years.

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, Biagio, Pietro, Alfieri and Soffici.

119. Italian Literature of the Nineteenth Century (4) II. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from the 18th to the present. Emphasis on the work of Stendhal, Volti, and Marivaux. Offered in alternate years.

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 Stendhal to the present. Emphasis on the work of Stendhal, Volto, Marivaux, and Vibertini.

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 culture.

131. Autobiography in Italy (4) III. Schiessari Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of representations of selfhood with particular attention to generic differences, the confessional tradition and the portrayal of women's self-representation. Authors studied may include Petrarca, Tasso, Casanova, Alfieri, Zorzi, Sibilla Aleramo and Primo Levi. Offered in alternate years.

138. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) I. Dutschke Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of Dante Alighieri's Divine 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.

139C. Italian Literature in English: Modern Italian Literature (4) III. Cannon Lecture/discussion—3 hours; term paper. The Romantic Movement in Italy in its relationship to European Romanticism. Offered in alternate years.

190. Italian Literature in English Translation: Dante, Divine Comedy (4) I. Dutschke Lecture/discussion—3 hours; term paper—1 hour. Prerequisite: any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworldly realms of Inferno, Purgatorio, and Paradiso. General Education credit: Civilization and Culture.

141. Culture, Gender and the Italian Renaissance (4) II. Schiessari Lecture/discussion—3 hours; term paper. 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 changes.

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 the 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. General Education credit: Civilization and Culture.

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 changes.

149. Italian Internship (1-3) I, II, III, IV, The Staff (Director in charge) Internship—3-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Open only to second year students. Internship is designed 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 (1, 5) I, II, III. The Staff Independent study—1.5 hours. Prerequisite: open only to majors in senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis in a topic in Italian literature, civilization, or language studies. (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 volunteer discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197C. Community Tutoring in Italian (1-5) I, II, III. Fossaro 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.)
Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

Robert G. Flocchini, Ph.D., Chairperson of the Department

Donald R. Nielsen, Ph.D., Associate Chairperson, Hydrologic Science Unit

Dennis E. Rolston, Ph.D., Associate Chairperson, Soils and Biogeochemistry Unit

Bryan C. Weare, Ph.D., Associate Chairperson, Atmospheric Science Unit

Department Office, 151 Hoagland Hall (916-752-1406)

Faculty

Soils and Biogeochemistry Unit

Office: 151 Hoagland Hall (916-752-1406)

Carolyn S. Bledsoe, Ph.D., Associate Professor (Soil Chemistry)

William H. Case, Ph.D., Assistant Professor (Soil Science)

Willie R. McPherson, Ph.D., Assistant Professor (Basic Agriculture)

John B. Whitt, Ph.D., Assistant Professor (Hydrology)

Emeriti Faculty

Francis G. Broadbent, Ph.D., Professor Emeritus

Richard G. Bursuk, Ph.D., Professor Emeritus

Edward L. Epstein, Ph.D., Professor Emeritus

Gordon L. Huntington, Ph.D., Lecturer Emeritus

Donald N. Munns, Ph.D., Professor Emeritus

Michael L. Schenk, Ph.D., Assistant Professor (Soil Science)

Robert Zasowski, Ph.D., Associated Professor (Soil Sciences)

Faculty

Atmospheric Science Unit

Office: 151 Hoagland Hall (916-752-1406)

John C. Carroll, Ph.D., Professor (Meteorology)

Robert G. Flocchini, Ph.D., Professor (Resource Sciences)

Richard D. Grotjahn, Ph.D., Professor (Atmospheric Sciences)

Emil T. Nathan, Ph.D., Assistant Professor (Atmospheric Science)

Kaye J. Pawl, Ph.D., Associate Professor (Atmospheric Science)

Roger H. Shaw, Ph.D., Professor (Meteorology)

Richard L. Snyder, Ph.D., Lecturer (Atmospheric Science)

Su-Tao Song, Ph.D., Associate Professor (Atmospheric Science)

Bryan C. Weare, Ph.D., Professor (Meteorology)

Emeriti Faculty

Kinsell L. Coulson, Ph.D., Professor Emeritus

Faculty

Hydrologic Science Unit

Office: 113 Veihmeyer Hall (916-752-3453)

Graham E. Fogg, Ph.D., Associate Professor (Hydrology)

David A. Gooldiner, Ph.D., Lecturer (Water Science)

Stephen Grattan, Ph.D., Lecturer (Water Science)

Mark E. Grismer, Ph.D., Associate Professor (Water Science, Agricultural Engineering)

Blaine R. Hanson, Ph.D., Lecturer (Water Science)

Jan W. Hopmans, Ph.D., Assistant Professor (Water Management)

Theodore C. Hisao, Ph.D., Professor (Water Science)

Allen W. Knight, Ph.D., Professor (Water Science)

Miguel A. Manu, Ph.D., Professor (Water Science, Civil Engineering)

Edward A. McBean, Ph.D., Professor (Water Science)

Donald R. Nielsen, Ph.D., Professor (Soil and Water Science)

Marc B. Parker, Ph.D., Assistant Professor (Agricultural and Water Science)

Terry L. Pullen, Ph.D., Assistant Professor (Water Science)

Kenneth K. Tanji, M.S., Professor (Soil Science)

Susan Ustin, Ph.D., Assistant Professor (Resource Science)

Wesley W. Wallander, Ph.D., Associate Professor (Water Science, Agricultural Engineering)

Emeriti Faculty

James W. Biggar, Ph.D., Professor Emeritus

Robert H. Burg, M.S., Professor Emeritus

Robert M. Grimes, Ph.D., Lecturer Emeritus

Delbert W. Kendon, 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

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 College of Environmental Science and Engineering, and Agricultural and Environmental Sciences.

Landscape Architecture

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Environmental Design.

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 with 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 space and three-dimensional concepts.

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 in problem-solving relating to design of parks, urban open spaces, energy-efficient neighborhoods, and reclamation projects, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. A process-oriented approach to design is stressed and environmental and community values are emphasized.

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 advisor for further information.

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

English Composition Requirement .................. 0-8

See College requirement

Preparatory Subject Matter ......................... 50-59

Biological Sciences (Biological Sciences 1A, 1B) .................. 4-5

Biological Sciences 1C .......................... 5

Chemistry (Chemistry 2A, 10) .................. 4-5

Physics (Physics 1A, 5A, 10) .................. 3-4

Two-dimensional design (Art 16, Design 21, Engineering 4) .................. 3-4


Earth sciences (Geology 1, Geology 1, Soil Science 10) .................. 3

Economics (Econ 1A, 1B, Agricultural Economics 147) .................. 4

Computer science (Science and Management 21, Engineering 5, Computer Science Engineering 10, 40) .................. 3-4

Mathematics (Mathematics 1A, 2A, Statistics 13, Agricultural Science and Management 150) .................. 3-4

Social science (Anthropology 2, Geography 2, 5, Psychology 1, 16, Sociology 1) .................. 3

Humanities elective .......................... 3

Depth Subject Matter ......................... 70-74

Introduction to landscape architecture (Landscape Architecture 40) .................. 3
Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113, 114, 115)...
24 Advanced communication for landscape architecture (Landscape Architecture 122)...
25 Introduction to landscape construction, site engineering, construction details and drawings (Landscape Architecture 131, 132, 133, 134)...
26 History of landscape architecture (Landscape Architecture 140)...
27 Introduction to environmental plants (Environmental Horticulture 8)...
28 Taxonomy and ecology of environmental plants (Environmental Horticulture 105)...
29 Arboriculture (Environmental Horticulture 133)...
30 Plant selection for environmental design (Landscape Architecture 155)...
31 Landscape planting design (Landscape Architecture 156)...
32 Landscape architecture studio: planning and analysis, urban and community design (Landscape Architecture 181, 182)...
33 Senior project in landscape architecture (Landscape Architecture 193)...
34 Proseminar, three quarters (Landscape Architecture 190)...
35 Internship (Landscape Architecture 192)...
36 Breadth Subject Matter...
37 Resource sciences, two upper division courses with approval of adviser...
38 Ecology (Environmental Studies 100, 110, Botany 117, Botany 117, Ecology 104, Zoology 114A, 114B, 114C)...
39 Environmental awareness (Psychology 144)...
40 Related disciplines elective...
41 Course to emphasize a discipline pertinent to landscape architecture (Environmental Biology and Management 110, 116, 122, 127, Environmental Studies 126, 161, 171, Agricultural Economics 18, Civil and Environmental Engineering 1, Design 1)...
42 Unrestricted Electives...
43 Total Units for the Major...
44 Major Adviser, S. McNeil...
45 Advising Center is located in 152 Walker Hall (916-752-1165)...
46 Graduate Study...
47 Refer to the Graduate Studies section in this catalog.

Courses in Landscape Architecture (LDA)

Lower Division Courses

11. Landscape Studio: Introduction (4) I. The Staff...
12. Landscape Drafting and Visualization (4) I. The Staff...
13. Landscape Construction: Introduction (3) III. The Staff...
14. Landscape Architecture: Principles of Practice (3) I. The Staff...
15. Landscape Construction: Site Engineering (4) I. McCullough...
16. Plants in the Cultural Environment (3) III. The Staff...
17. Landscape Architecture Studio: Landscape Form, Design, and Art (4) II. Scherker and staff...
18. Computer Graphics for Landscape Architects (4) I. McCullough...
19. Landscape Graphic Communication (4) II. The Staff...
20. Advanced Communication for Landscape Architecture (4) III. Francis and staff...
21. Landscape Construction: Site Engineering (4) I. McCullough...
22. Sustainable Landscape Architecture (4) II. Thayer...
23. Landscape Architecture Studio: Landscape Form, Design, and Art (4) II. Scherker and staff...
24. Proseminar in Landscape Architecture (111, 112, 113, 114, 115)...
25. Internship (Landscape Architecture 192)...

*Course not offered this academic year.*
problems will be utilized at the site, urban or rural scale. Offered in alternate years.
220. Public Space and Culture (3) III. Francis Seminar—4 hours. Prerequisite: course 102 or the equivalent; graduate standing or consent of instructor. Examines the public environment of American 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 and analyze in alternate years.
240. Rural Landscape Planning and Design (3) Seminar—3 hours. Prerequisite: course 181 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural farmland, subdivisions, commercial zones, and small communities in their challenge of economic and social change. Concern is with runway growth, shrinking populations, shifting economies, and lack of public funds or consensus. Offered in alternate years.
250. Technology and Sustainable Landscape (3) III. Thayer 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.
260. Landscape Conservation (3) III. 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 theories 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. (SU 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. (SU grading only.)
298. Group Study (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. (SU grading only.)
299. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. (SU grading only.)

**Latin**

**See Classics**

**Law, School of**

Bruce A. Wolk, J.D., Dean
Rex R. Perschbacher, J.D., Associate Dean (Academic Affairs and Research)
George S. Grossman, LL.B., M.S.L.S., Director (Law Library)
Dean's Office, 711 Main Martin Luther King, Jr. Hall (916-733-2043)

*Course not offered this academic year.

**Faculty**

Vickram Amar, A.B., 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. Buch, J.D., Professor
Joel C. Dobris, LL.B., Professor
Harrison C. Dunning, LL.B., Professor
Floyd V. Feeney, LL.B., Professor
Daniel Wm. Fessler, J.D., S.J.D., Professor
Arturo Gandara, J.D., Acting Professor
Michael J. Glennon, J.D., Professor
Gary Goodpaster, J.D., Professor
Sarah D. Gray, Ph.D., Professor (Human Physiology)
Robert W. Hillman, J.D., Professor
James E. Hogan, LL.B., Professor
Edward J. Iwminkeled, J.D., Professor
Ellen E. Jordan, J.D., Professor
Margaret Z. Johns, J.D., Lecturer and Director of Legal Writing
Kevin R. Johnson, J.D., Professor
Friedrich K. Jueger, J.D., Professor
Evelyn L. Kirkland, J.D., Acting Professor
Leslie A. Kurtz, M.A., J.D., Professor
Millard Murphy, B.A., J.D., Lecturer
Eric Brad Nelson, J.D., Lecturer
John B. Oakley, J.D., Professor
Raymond I. Parnas, J.D., LL.M., S.J.D., Professor
Rex R. Perschbacher, J.D., Professor
John W. Poulos, J.D., Professor
Edward H. Rabin, LL.B., Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Lecturer
Bruce A. Wolk, J.D., Professor
Richard C. Wydick, LL.B., Professor

**Emeriti Faculty**

Horner G. Angelo, J.D., LL.M., Professor Emeritus
Edward L. Barrett, Jr., J.D., Professor Emeritus
Florian Bartosic, B.C.L., LL.M., Professor Emerita
Daniel J. Dykstra, LL.B., S.J.D., Professor Emeritus
Pierre R. Lassaux, LL.B., LL.M., Professor Emeritus
Monte D. Schwartz, J.D., LL.M., M.S., 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 section at the front of the catalog. The symbols are (I) for Fall Semester and (II) for Spring Semester.

**Courses in Law (LAW)**

Professional Curriculum

**First Year Courses**

200. Introduction to Law (1) I. Perschbacher Discussion—1 hour. Introduction to basic concepts of the law, the history of the 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. (SU grading only.)
201. Property (4) II. Dobris Discussion—4 hours. Study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes the estates in land system, the landlord-tenant relationship, conveyancing, and private and public land use control.
202A-202B. Contracts (3-3) I. Bruch, Iwminkeled; II. Gandara, Iwminkeled Discussion—3 hours. Course examines the sorts of problems that arise in contract and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts or fails to adjust to changing social demands. (Deferred grading only, pending completion of sequence.)
203. Civil Procedure (5) III. Hogan, Johnson, Oakley, Perschbacher Discussion—5 hours. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil
disputes. Among the topics covered are 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 and trial; witness; evidence; expert testimony; decisions for resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial court's disposition.

204A-204B. Torts (3-2-1). Brownstein, Kurzt

Discussion and Emergency legal concepts which apply to actions brought by litigants who seek relief for personal and personal injuries. Analysis of actions and policies based upon wrongful conduct, consent, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. (Deferred grading only, pending completion of sequence.)

205. Constitutional Law I (4) II. Brownstein, Goodman

Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, courses treat judicial review, jurisdiction, standing, state and federal courts, state and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in courses 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) I. Feeley, Johns, Poulos

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) I. Bernhard

Discussion—laboratory—1 hour. Description of the variety of sources of law and secondary authority. Instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

208. Legal Writing (2) II. Bernhard, Johns, Marks

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 shown as below.

(a) General courses: 205, 217, 222, 226, 237, 240, 244, 250, 254, 258, 259, 266, 267, 268, 271, 280, 281, 286, 292, 296


(c) Constitutional Law: 218, 286

(d) Criminal Law: 227, 238, 245, 276, 284, 290

(e) Family Planning: 221, 223, 294

(f) Family Law: 225, 234, 272, 273

(g) International Comparative and Foreign Law: 217, 230, 233, 248, 249, 252, 257, 291

(h) Labor and Employment Relations Law: 251, 255, 260, 279

(i) Procedure and Jurisdiction: 242, 246, 275, 277, 282, 283


(k) Public Law: 231, 235, 261, 293

(l) Skills and Legal Writing: 211, 219, 253, 278, 297, 410A, 410B, 412, 413, 414, 415

(m) Taxation: 239, 248, 249

(n) Individual and Group Study: 298, 299, 416, 417, 419, 496

(o) Clinical Programs: 425, 430, 440, 450, 455, 465, 470, 480

209. Alternative Dispute Resolution—Techniques and Practice (2)

Discussion—2 hours. Course focuses on the theory of alternative dispute resolution (ADR). History and evolution of alternatives to the judicial system for resolution of disputes is given, including understanding the distinctions between: (a) binding arbitration, (b) non-binding arbitration, (c) statutory arbitration, (d) contractual arbitration, (e) mediation, (f) private judgment, and (g) mediation. Examines the question of whether or not to use a form of alternative dispute resolution and if such selection is made, tactics and strategies that may be applicable. Second portion of the course is clinical. Students will be expected to participate in various forms of alternative dispute resolution procedures. Case scenarios provided by the instructors. Additionally, students encouraged to attend ADR proceedings with the instructors in connections with their practice. Guest presentations from arbitrators and judges engaged in private judging. Limited enrollment.

210. Business Reorganizations (2)

Discussion—2 hours. Prerequisite: course 243 recommended. Focus is on businesses trying to survive when they are in substantial debt, exploring the structure and relief available under Chapter 11 of the Bankruptcy Code. Focus is on the problems of a troubled debtor and the strategies or options available to meet them.

211. Negotiation and Dispute Resolution (2)

Discussion—2 hours. Course teaches negotiation, mediation, arbitration skills, and theories. Students will do five or more practice negotiations, mediations, or arbitrations to develop skills in perception, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment. (SU grading only.)

212. Law, Medicine, and Ethics (2)

Discussion—2 hours. Analysis of the ethical and legal issues raised by advances in medical knowledge and technology and the biomedical sciences. Examination of the nature of ethical decision making and its special relationship to the law. Discussions on death and dying, new reproductive alternatives, abortion, maternal/fetal conflicts, AIDS, organ transplantation, and the right to health care. Emphasis on how individuals make determinations regarding what is "right" and "wrong" and how society makes decisions regarding what should be allowed or prohibited.

213. Business Organizations I (3)

Discussion—3 hours. Focus on the legal problems of a business owned by a few persons each of whom may seek to play an active role in the enterprise. Included within the survey are the problems of the "close corporation" and the alternatives to incorporation for persons in quest of profit. These alternatives include the sole proprietorship, general and limited partnerships and joint ventures. Related agency concepts are integrated into this material.

214. Business Organizations II (3)

Discussion—3 hours. Focus on the public issue corporation. Both statutory and judge-made legal principles of state corporate law, and federal regulation of the corporation will be studied. Corporate governance and the grow-up market for insider trading, suits against corporations, regulation of the sale of securities and distribution of dividends, and the merger and acquisition of corporations will be covered.

215. Business Associations (4) I. Gevurtz, II. Kirkland

Discussion—4 hours. Course provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely held. Principal attention is given the corporate form of organization, although partnerships and the general and limited partnerships are also considered. Topics include planning of business transactions, the process of incorporation, the financing of the corporation, the role of management and shareholders, the federal securities laws, and social responsibility.

216. Commercial Law: Article 9 (3) I. Riemel

Discussion—3 hours. Prerequisite: course 243 recommended. Course covers security interests in personal property.

217. Institutional and Legal Aspects of International Telecommunications (2) I. Angel

Discussion—2 hours. Examines the impact of international law, treaties, and selected regional (European Communities) and national laws on the expanding fields of telecommunication and space law. Links between international organizations such as the ICTU, Eutelsat, and Intelsat, national institutions such as NASA and the FCC, and private entities will be surveyed. Special legal problems examined, such as the protection of hardware and intellectual property, piracy, freedom of information, restraint on competition, and protection of privacy will be examined. Limited enrollment.

218. Constitutional Law II (3) I. Brownstein, III. Goodfriend

Discussion—3 hours. Course principally covers 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 will also be directed 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) I. Hogan, II. Wydick

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) I. The Staff

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 taxation 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) I. Kirkland, II. Dobris

Discussion—3 hours. Study of the law of wills and trusts. Course coverage includes: intestate succession; family probate and limits on the power of testation; execution, revocation and revival of wills; contracts to make wills; will substitutes; intestate and testamentary private trusts. Depending on the instructor the course may also cover one or more of the following topics: 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. Agricultural Law (3)

Discussion—3 hours. Exportation and importation of agricultural products will be covered, including tariffs, quotas, and non-tariff barriers, the General Agreement on Tariffs and Trade (the GATT), United States trade legislation (escape clause, and antidumping and countervailing duties) and the General System of Preferences. The trading regimes of America's major agricultural trading partners, the European Community, Canada (the agricultural aspects of the Free Trade Agreement), and Mexico will be analyzed.
223. Estate Planning (2) I. Seminar—2 hours. Prerequisite: course 221. Selected topics in the estates and trusts area. Class presentation and research paper will satisfy the legal writing requirement. Limited enrollment.

224. Consumer Transaction (3) I. Discussion—3 hours. Study of selected consumer law problems, including the regulation of state and federal regulatory efforts. Course coverage may include the following: common law and statutory approaches to fraudulent or deceptive practices, disclosure of information, consumer credit regulation, equal credit opportunity, personal injury claims, antitrust law, and the role of enforcement by the creditor, consumer remedies, and attorney fees for representing consumers.

225. Marital Property (3) I. I. Staff 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. Mass Media Law (2) I. Discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will include press and First Amendment issues, newsgathering, the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

227. Criminal Procedure (3) I. Parras; I. Feeney Discussion—3 hours. The police function: arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineup, the exclusionary rule, the role of counsel.

228. Business Planning (3) I. Discussion—3 hours. Prerequisites: courses 220, and either courses 213 and 214 or course 215. Consideration of selected problems in business planning.

229. Commercial Real Estate Transactions Seminar (1) I. Seminar—3 hours. Planning, negotiating, and drafting involved in commercial real estate transactions. Students work on a series of transactions that might include a purchase and sale transaction, a loan construction transaction, a joint venture transaction. Students learn to determine client objectives, to develop a transaction structure to achieve these objectives, and to prepare documents involved in the transaction.

230. International Law and World Order (2) I. Seminar—2 hours. Seminar describes the challenges posed to international law by the end of the cold war, including implications for international organization, collective security arrangements, international environment, democratization, theories of international law, and related topics. Satisfies advanced legal writing requirement.

231. Legislative Process (3) I. Discussion—3 hours. Course covers 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.

232. Real Estate Finance (3) I. Austin Seminar—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. International Human Rights (2) I. Johnson Seminar—2 hours. Prerequisite: course 202. Focus will be on an examination of the admission of refugees into the United States. Detailed study of the Refugee Act of 1980, the major piece of legislation dealing with the admission of refugees into the country, and the various legal claims urged by the Department of Justice implementing the law. Particular attention will be paid to recent decisions of the United States Supreme Court and the courts of appeals interpreting the Refugee Act, the impact of those decisions, and topical issues presently the subject of litigation. The class will review international law Congress sought to bring domestic law in compliance with passage of the Act. Students will satisfy the advanced legal writing requirement.

234. Family Law Practice (3) I. Martellini Seminar—3 hours. Prerequisite: course 225; course 227 recommended concurrently. Combined seminar and clinic provide practical counseling under the direct supervision of the instructor. Clinical participation required twice during semester. Students also participate in weekly 2-hour seminar which will cover a wide range of topics, focusing on selected family law practice. Limited enrollment. (SUJ grading only.)

235. Administrative Law (3) I. Gandara Discussion—3 hours. State and Federal law related to administrative agencies. Topics include administrative due process, agency adjudication, rulemaking, delegation of authority, standing, and judicial review. Students will become conversant with the Federal Administrative Procedure Act and the 1981 Model State Administrative Procedure Act.

236. Securities Regulation (2) I. Discussion—2 hours. Prerequisite: courses 213 and 215, or consent of instructor. Principal focus of this course is the Securities Act of 1933. Topics covered include registration requirements, the effects of registration statements, exemptions from registration, secondary offerings, liabilities under the 1933 Act, express and implied causes of actions, the definition of a security, ex ante and ex post realizations, and regulation. Particular attention is devoted to problems of small issuers of securities.

238. Business Tax (4) I. Simmons Discussion—4 hours. Prerequisite: course 220. The owners of partnerships and subchapter S corporations (pass-through entities) are taxed on items of income, deduction, and loss, as if the owner incurred the item directly. Corporations and shareholders are subject to income and shareholder level taxes. This course examines the identity, organization, operation, and dissolution of pass-through entities in terms of the income tax impact of these transactions. Also examined are the formation, capitalization, operation, and liquidation of regular corporations subject to the double tax regime of subchapter C of the Internal Revenue Code.


240. Elections and Political Campaigns (2) I. Feeney Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest. Satisfies advanced writing requirement. Limited enrollment.

241. Regulated Industry Seminar (2) I. Fessier Seminar—2 hours. The social, political, technological and economic forces implicate in the regulation of traditional public utility industries. Regulated private monopolies that were classically insulated from the pressures of competition are being structured to accommodate and encourage competition at various levels of the supply and distribution chain. As the social contract is altered, the use of public and private monopolies, the regulatory role and the economic goals are rapidly being undermined by the constraints of competitive market forces and the unwillingness of firms deprived of regulatory protection to provide services that are not cost effective on a stand alone basis. The resultant political and procedural challenges to decision makers and individuals who would act as advocates in an administrative setting. Each student will prepare and present a paper on a topic approved by the instructor. Satisfies advanced legal writing requirement.

242. Conflict of Laws (4) I. Juenger Discussion—4 hours. Study of transactions with multiple or international contacts. The topics covered include jurisdiction, recognition of judgments, and choice of applicable law. The course deals with problems practitioners frequently encounter in a wide variety of fields, such as commercial law, family law and personal injury law.

243. Debtor-Creditor (3) I. Ayer 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) I. Gray 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 the hope of the association which have been developed. Students 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 knowledge of expected outcome, withstand in the particular cases. Limited enrollment. (SUJ grading only.)

245. Advanced Criminal Law (2) I. Wolk Seminar—2 hours. Prerequisite: course 227: membership in a “death penalty” seminar (because of the constraints imposed by professional ethics, the seminar must be limited to work on one side of the death penalty cases. This year students may work only on the defense side, beginning at a meeting during the fall semester to finalize enrollment; and consent of instructor. In-depth study of selected death penalty issues focusing on federal constitutional and California law. Students will work on death penalty cases under the supervision of the lawyers handling the cases and instructor. There will be a formal classroom component to the course and a paper is required. The student’s work on the case (such as a portion of the brief) will satisfy the paper requirement.

246. Federal Jurisdiction (3) I. Oakley Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Statutory provisions for the federal courts to exercise jurisdiction under federal law or between parties of diverse citizenship will be examined in contemporary detail, and from the perspective of history and the Constitution. Federal appellate jurisdiction, federal writs in the nature of habeas corpus, and miscellaneous matters affecting attorneys’ decisions to seek a federal forum will also be discussed. In addition to careful study of the fine points of relevant legislation in light of their history, the course will examine and develop the constitutional doctrines of separation of powers and federalism as guides to understanding the Supreme Court’s leading opinions on the scope of federal jurisdiction.

247. Advanced Business Tax (3) I. Simmons Discussion—3 hours. Prerequisite: course 220 and 238. Continuation of course 238. Focuses on the federal income tax considerations involved in the transfer of business assets including corporate liquidation as an asset acquisition technique, corporate reorganizations, divisive reorganizations, and the transfer of corporate attributes in a reorganization transaction. Also examines tax planning for affiliated groups of corporations.

248. International Law (3) I. Goodpaster Discussion—3 hours. Prerequisite: course 217 recommended. This intermediate course covers 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 laws...
and national law; and the jurisprudence of international law.

249. Comparative Law (2) I. Juenger Discussion—2 hours. Comparison of methods and sources of common and civil law: background and structure of the principal civil codes; analysis and study of problems arising in international transactions.

250. Jurisprudence (2) I. Oakley Seminar—4 hours. Social commentary on the relationships 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 his duties? How should 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 will be followed by a sampling of philosophical essays analyzing particular problems of adjudication. Grading will be based on active class participation and on an original paper. Limited enrollment.

251. Labor Law (3) II. West 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.

252. International Litigation and Arbitration (2) I. Smith Discussion—2 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 covered include jurisdiction, the enforcement of judgments, the relative merits of arbitration and adjudication, international discovery and international professional law problems.

253. Products Liability (3) II. Discussion—3 hours. Civil action for harm to the consumer resulting from dangerous and defective products.

254. American Legal History (2) I. Bartocci Seminar—2 hours. Historical study of the relationships between legal change and social and political movements. Between 1853 and 1869, the Warren Court made enormous changes involving civil rights, civil liberties, criminal procedure, federal-state relations, and legislation. If these legal movements occurred in the midst of the McCarthy period and the Cold War, the civil rights struggle, the anti-war movement, the populism of folk music, and rock and roll, the beginning of the space age, the Great Society, the legislative program, and economic prosperity. What is the relationship between legal change 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. Survival advanced legal writing requirement. Limited enrollment.

255. Pension and Employee Benefit Law (3) II. Wolk Discussion—3 hours. Regulation and taxation of private pensions and employee benefits. The course will focus on the Employee Retirement Security Act of 1974 (ERISA) and will deal with such topics as coverage, vesting, integration with social security, funding, and fiduciary issues (both during marriage and after divorce), retiree health and welfare plans, and preemption of state law. Fiduciary problems will also be examined, particularly in the area of corporate takeovers and plan investments. Problems surrounding plan terminations will also be considered, including bankruptcy issues. Pension Benefit Guaranty Corporation insurance, and the issue of asset reversions to taxpayers in the case of overfunded plans.

256. Land Use Planning (2) I. Taylor Discussion—2 hours. Legislative, judicial, and administrative methods used to facilitate the rational use of land. Legal topics considered within this context will include zoning, subdivision regulation, nuisance, eminent domain, general plans, and environmental controls affecting land use.

257. Foreign Relations Law (3) Discussion—3 hours. Prerequisite: course 217 or consent of instructor. Seminar covers subjects such as the war power, the treaty power and executive agreements, arms sales, intelligence gathering, the recognition power, the negotiation power, the scope of the appropriations power as a check on executive activities, and other separation-of-powers issues generated by the intersection of national law and constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

258. Professional Responsibility (1) I. Parchman 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. Required of all students for graduation. (SU grading only.)

259. Feminist Legal Theory and Practice Seminar (2) I. Smith 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) I. West 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. Local Government (2) Seminar—2 hours. Issues arising from two relationships: that between cities and higher levels of government, and that between cities and the people who live within their boundaries. Topics include: 1) state and federal preemption of local laws; 2) state and federal power to restrict cities’ freedom of speech; 3) city efforts to control the character of a community; 4) citizens’ abilities to influence the conduct of politically constrained and federal rights; and 5) citizens’ abilities to influence city policy through voting. Local antitrust and environmental regulation may also be covered. Class participation and a final paper will satisfy the advanced legal writing requirement. Limited enrollment.

262. Antitrust (3) I. Wyckoff Discussion—3 hours. Survey of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

263. Trial Practice (3) I, II. Immink 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 will be held on Tuesday, Wednesday, or Thursday evening. Limited enrollment. (SU grading only.)

264. Water Law (3) II. Dunning 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 is placed upon California water law and policy.

265. Natural Resources Law (2) Seminar—2 hours. An exploration of the origin, contemporary applications and potential of the public trust doctrine. This common law doctrine, long of significance with regard to the ownership and use of coastal lands, has recently also become very important for California water rights law. Many in the environmental community have suggested applications of the doctrine in other areas, e.g., wildlife and wilderness protection. Students will read materials on the public trust doctrine and on the closely related doctrine of state sovereign ownership and will prepare several short papers. No final examination. Limited enrollment.

266. Wildlife Protection Law (2) Seminar—2 hours. Course will encompass federal and state laws directed at wildlife protection, as well as international norms. Required paper will satisfy the advanced legal writing requirement.


268. Jewish Law Seminar (2) I. Rabin Discussion—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 and 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 will fulfill the advanced legal writing requirement. Neither a knowledge of foreign language nor a previous exposure to Jewish law is necessary. Limited enrollment.

269. Corporate Finance (3) II. Ayer Discussion—3 hours. Focuses on how businesses raise money. Consists of two parts: a study of elementary "finance theory" and consideration of how this theory is applied by courts and legislatures.

270. International Business Transactions (2) Discussion—2 hours. Consideration of selected problems in international business transactions.

271. Insurance Law (2) I. Jordan Discussion—2 hours. The insurance contract and its evolution; life, property, accident and other risks insured against; construction and enforcement of the various types of policies; statutory and regulatory controls.

272. Family Law (3) II. Bruch Discussion—3 hours. Emphasizes the legal, social and personal aspects of family law and relationships, including issues concerning medical care, neglect, dependency, abuse, foster care, termination of parental rights, adoption, emancipation of minors, artificial insemination, surrogacy, paternity, surrogacy, birth control, abortion, child support and child custody. How attorneys, mental health professionals and the judicial process do and should deal with these issues (e.g., interviewing, counseling, and mediation) are also considered.

273. Current Issues in Family and Marital Property (2) Seminar—2 hours. Prerequisite: course 225, course 230 or 272, or consent of instructor. 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 will select one issue for research and preparation of a draft bill or 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 legal writing requirement.

274. Intellectual Property (3) I. Kurtz Discussion—3 hours. Study of the protection of intellectual property and unfair competition. Among the topics considered are trade secrets, patents, trademarks, misleading and false advertising, and copyrights.

*Course not offered this academic year.
275. Complex Litigation (3) II. Pershbacker
Discussion—3 hours. Study of issues that frequently arise in large, complex litigation involving multiple parties and multiple claims. The class treats in depth topics introduced in the first-year civil procedure course, with emphasis on issues currently being litigated. Topics include complex parties, joinder, multidi- triet, fraud, motion practice and sanctions, class actions, litigation discovery and "discovery abuse," including privilege and work product claims, judicial management and settlement of litigation, expert and demonstrative evidence in civil litigation. Not all topics will necessarily be covered in any one semester.

276. Juvenile Justice Process (2) II. The Staff
Discussion—2 hours. Legal and philosophical bases of a system for the decent handling of juveniles. Emphasis on case studies and field trips. Advancement of legal writing requirement may be satisfied at the discretion of the instructor.

278. Pretrial Skills (3) II. Smith
Discussion—3 hours. Of counsel to students who have completed their first year course. The course uses a series of role-playing exercises and case discussions to introduce students to a variety of non-trial skills basic to the practice of law. The course concentrates on client interviewing and counseling, but will also include exercises in witness interviewing, negotiation, drafting of pleadings, discovery plans, and discovery documents. It is an expanded version of the client counseling course. Limited enrollment.

279. Public Sector Labor Law (2) Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Application of private sector labor law doctrines to the public sector. Emphasis is on the four California public sector statutes and the impact of constitutional law on public employees. Class participation and seminar paper will satisfy advanced legal writing requirement. Limited enrollment.

280. Advanced Legal Writing Seminar (2) I. Wyckoff
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 will complete an individual writing project in lieu of final examination. Grading will be based on participation in class and the student's seminar paper. Designed to satisfy the school's advanced legal writing requirement. Limited enrollment. (SU grading only.)

282. Energy Law (2) Discussion—2 hours. Prerequisite: course 235. Introduction to regulation of the energy sector. Topics to be covered include regulation of natural monopolies, regulation of electricity and natural gas, legal aspects of the development of conventional and alternative energy sources, and economic and energy policy. Limited enrollment. (SU grading only.)

283. Remedies (3) II. Amar
Discussion—3 hours. Study of common law remedies: damages, specific performance, injunctions, and restitutionary relief. Focus of course will be on the efficiency, fairness, and practicality of the alternative remedies available to the practitioner and the court.

284. Advanced Criminal Procedure (3) I. Parnas
Discussion—2 hours. Focus on essential skills necessary to handle criminal cases. Topics may include bail, trial, post-conviction, discovery, plea bargaining, trial by jury, and sentencing.

285. Environmental Law (3) I. Frank
Discussion—2 hours. Introduction to law dealing with environmental problems, with particular emphasis on the National Environmental Policy Act, and to pollution control law. Particular emphasis is given to the Clean Water Act and various statutes on topics in the environment. An introduction to the Clean Air Act is also provided.

286. Law and Economics (2) Discussion—2 hours. Prerequisite: prior background in economics is welcome but not necessary. Legal issues using economic analysis. Possible topics include the economic consequences of liability rule, economic analysis of contract law, theory of the firm and basic economics of corporate law and antitrust, the theory that the common law is efficient, and economic interpretation of basic concepts of Anglo-American law such as rights, property, harm and equality.


288. Advanced Constitutional Law Seminar (2) Seminar—2 hours; paper. Explores in-depth selected topics or problems in constitutional law and theory. Topics may include public choice theory, the public/private distinction, community-based theories of constitutional order, theories of judicial review, theories of the First Amendment, the nature of constitutional law, rhetoric, etc. Problem areas may include separation of powers, freedom of speech, substantive due process, equal protection, affirmative action, and constitutional interpretation. Satisfies advanced legal writing requirement. Limited enrollment.

289. Toxicology (2) I. Dunning
Discussion—2 hours. Government efforts to regulate the release of toxic substances into the environment and to clean up existing toxic dump sites. "Toxic torts"—personal injury actions related to toxic in the environment—are included.

290. Criminal Justice Administration Seminar (2) I. Parnas
Seminar—2 hours. Consideration of possible reform efforts in criminal justice administration. Guest lecturers in early sessions. Class presentation by each student. In classes where there is a written component, the student must complete and turn in a term paper. Grading will be based on the quality of the presentation and participation in class. Grading will be based on participation in class and the student's seminar paper. Designed to satisfy the school's advanced legal writing requirement. Limited enrollment.

291. International Trade Law and Latin American (3) II. Smith
Discussion—3 hours. Covers the role of the executive, legislative and judicial branches of the United States with respect to international trade policy as it relates to Latin America. International topics include the General Agreement on Tariffs and Trade (GATT), the North American Free Trade Agreement, the Summit of the Americas and the World Trade Organization.

292. Immigration Law and Procedure (3) I. Johnson
Discussion—3 hours. Course will survey a brief history of U.S. immigration and policy; federal agency interaction; public health and State Department; entry of nonimmigrant (temporary) visitors and immigrants into the United States; the worldwide quota and preference systems; family and employment relationships; 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 conviction; refugee and asylum; administrative appeals, federal and state judicial relief, citizenship and naturalization.

293. Public Interest Law (2) I. Johnson
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. Problems in Judicial Administration (2) Seminar—2 hours. Prerequisite: course 221. Selected topics in the judicial administration of courts and trusts. Required class presentation and research paper will satisfy the advanced legal writing requirement. Limited enrollment.

295. Securities Regulation II (2) Discussion—3 hours. Of counsel to course 213 or 215, or consent of instructor. Course 236 recommended. Principal focus is the Securities Exchange Act of 1934 and the regulation of securities markets. Topics include the evolution of securities markets and market efficiency, continuous reporting, institutional investors, shareholder voting and going-private transactions, regulation of securities markets and securities professionals, responsibilities of securities lawyers, transactional securities fraud, and enforcement of the securities acts.

296. Copyright and Entertainment Law (3) II. Kurtz
Discussion—3 hours. First half of course will involve a detailed consideration of the law of copyright, with emphasis on its application to motion pictures, music, television, and theatre. Second half of course will involve a study of other legal problems in the entertainment industry, including misappropriation, protection of titles, characters, group names, slogans, and the rights of privacy and publicity.

297. Client Interviewing and Counseling (2) II. Smith
Discussion—2 hours. Students who have taken course 276 cannot enroll in this course. Course uses a series of role-playing exercises and class discussions to introduce students to a variety of non-trial skills basic to the practice of law. Course concentrates on client interviewing and counseling, but may also include exercises in witness interviewing and negotiation. Limited enrollment.

298. Group Study (1-4) I. II. The Staff
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 program for the first semester of 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) the three-member faculty board 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 supervised project completed by the semester subject to the faculty board. (SU grading basis only unless the entire group requests letter grades in advance.

299. Research in Legal Problems (1-4) I. II. The Staff
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 may 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. (SU 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 law elements or 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).

Professional Courses

410A. Appellate Advocacy (Mock Court) (1)
Program includes case analysis, oral argument, 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 competition. Limited enrollment. (SU grading only.)

410B. Appellate Advocacy (Moot Court) (1) II. 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. (SU grading only.)

412. Carr Intraschool Trial Advocacy Competition (1) I, II. The Staff
Composition—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 participating in a trial presented by judges and criticized by experienced litigators. Limited enrollment. (SU grading only.)

413. Interschool Competition (1-3) I, II. The Staff
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 participation on 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. (SU grading only.)

414. Moot Court Board (1) I, II. The Staff
Prerequisite: course 410A-410B. Members of Moot Court Board may receive one credit for each semester of service on the board, up to a maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. Limited enrollment. (SU grading only.)

416. Law Review Writer (1-2) I and II. Writing of an editorship quality law review article under the 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 for 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. (SU grading only.)

417. Law Review Editor (2) I, II. The Staff
Editors must have completed an editorship article and must perform editorial duties requiring 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. (SU grading only. Deferred grading pending completion of sequence.)

418. Environa Editor (1) I. Dunn
The Editors of Environa may receive one credit for each semester of service. Credit must be approved by the faculty adviser to Environa. Only one person may receive this credit in any one semester. (SU grading only.)

419. Advanced Writing Project (1-4) I, II. The Staff
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 effect of at least 20 typed, 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 draft of administrative regulations (with explanatory comments). A 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.)

425. Judicial Clinicals (2 to 6 or 12) I, II. Jordan
Clinical Program—To be arranged. Prerequisite: relevant substantive and procedural courses recommended. Students may apply for individual judicial clerkship in a federal or state court and with the judges of their choice with the approval of the Clinical Committee and upon the sponsorship of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinicals (course 420). (SU grading only.)

430. Clinical Program in Federal Taxation (2-6) I, II. Simmons
Clinical—2-6 hours. Prerequisite: course 220. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. (SU grading only.)

440. Clinical Program in Immigration Law (2 to 6 or 12) I, II. Smith
Discussion—2-12 hours. Client clinic course will include a seminar on immigration law practice, individual weekly case conference with faculty supervising and assigned immigration law cases. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assures 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. (SU grading only.)

450. Clinical Program in Environmental Law (2-6) I, II. Dunning
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 hours per week. (For purpose of this course, "environmental law" includes land use control by public means and also water pollution control. Subjects will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience, and to participate in occasional meetings of students enrolled in program. (SU grading only.)

455. Clinical Program in Employment Relations (2 to 6 or 12) I, II. West
Clinical Program. Prerequisite: prior or concurrent enrollment in course 251 or 260 or consent of instructor. Practical experience in employment relations, private and public sector labor law, or employer discrimination. Students will work under the direct supervision of a government or private lawyer and will 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. Weekly journals and attendance at monthly small group meetings required. (SU grading only.)

465. Clinical Program in Administrative Law (2-6) I, II. Gandare
Clinic—2-6 hours. Prerequisite: course 235 (may be taken concurrently). 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. Upon successful completion of this clinic will be a benefit to the students in the areas of formal adjudication, informal adjudication, rule-making, and judicial review. Students will be required to meet monthly as a group to share experiences and maintain observational journals. (SU grading only.)

470. Clinical Program in the Administration of Criminal Justice (2 to 5 or 12) I, II. Feeney
Clinical program. Prerequisites: courses 219, 227 and 263A. 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 for a minimum of 13 office hours per week. Students enrolled in the program engage in the full range of activities associated with their specific office with emphasis on observation and participation in fact investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Journals and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (SU grading only.)

480. Clinical Program in Prison Law (2-6) I, II. Murphy
Clinical Program. Provides practical experience in providing legal services to jail inmates who have various problems related to their incarceration in state prison. The services require analysis and application of Criminal Law, state statutory law, agency regulations, and the rules of professional responsibility. Students will work under the direct supervision of the Prison Law clinic 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. (SU grading only.)

495. Instruction in Legal Research and Legal Writing Skills (1-2) I. Bernard: II. Bernard:ns, Johns, Participates will assist in instructing 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. (SU grading only.)

## Linguistics

(College of Letters and Science)

Steven G. Lapointe, Program Director

Program Office, 922 Sprout Hall (916-752-9393)

**Committee in Charge**

Walter A. Bennewe, Ph.D. (Linguistics)
Diane Bentari, Ph.D. (Linguistics)
Patrick Farrell, Ph.D. (Linguistics)
Steven G. Lapointe, Ph.D. (Linguistics)
Maria I. Mauoli-Manea, Ph.D. (French)
Almerindo O. Ojeda, Ph.D. (Linguistics)
Mary Schleppergrein, Ph.D. (Linguistics)
Lorren A. Tinn, Ph.D. (French)
Maximo Torreblanca, Ph.D. (Linguistics)
Aram Yengoyan, Ph.D. (Anthropology)

**Faculty**

Walter A. Bennewe, Ph.D., Professor
Diane Bentari, Ph.D., Assistant Professor
Nina F. Dronkers, Ph.D., Assistant Adjunct Professor
Patsy A. Forrester, Ph.D., Associate Professor
Steven G. Lapointe, Ph.D., Associate Professor
Minor Program Requirements:
The minor in Linguistics is designed to provide the student with a basic knowledge of linguistic analysis. It would be appropriate for students interested in any aspect of language use.

**Linguistics**

4

Additional units of upper division Linguistics courses, chosen in consultation with an adviser

8

Minor Adviser. Same as Major adviser.

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, L.A. Timm.

**Courses in Linguistics (LIN)**

**Lower Division Courses**


Lecture—3 hours; discussion—1 hour. Introduction to the study of language, its nature, diversity, and structure. General Education credit: Civilization and Culture.

10. Elementary American Sign Language (5) I, II. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to American Sign Language and its vocabulary, with emphasis on conversational skills.

11. Elementary American Sign Language (5) II, III. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 10. Continuation of course 10.

12. Elementary American Sign Language (5) II, III. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 11. Continuation of course 11.

13. Intermediate American Sign Language (5) I. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 12. Study of American deaf culture through conversation and narratives; dialects of American Sign Language; deaf education.

21. Introduction to Reading and Composition for Non-Native Speakers (5) I, II. 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, II, 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.)

**Upper Division Courses**

100. Languages of East Asia (4) I, II. Wallacker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of languages and language families of East Asia, their cultures and histories.

102. Historical Linguistics (4) I, II. Benware

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 109. Description and methods of the historical study of language; sound change, morphological change, syntactic, semantic change.

109. Phonetics (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

113. Language, Gender and Society (4) I, II. Timm

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Investigation of real and putative (stereotyped) sex-linked differences in language and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. General Education credit: Contemporary Societies.

115. Chicano Sociolinguistics (4) I, II. Timm

Lecture—3 hours; term paper. Prerequisite: course 1 and Spanish 3, or the equivalent. Topics covered include the linguistic features of Chicano Spanish, Chicano English code-switching, regional and social diversity in Chicano Spanish, and the acquisition of bilingualism, language choice and use, attitudes about Spanish and English, Chicano language maintenance and shift, Chicano biculturalism and education, offered in alternate years.

116. The Spanish Language in the United States (4) III. Torreblanca

Lecture—3 hours; term paper. Prerequisite: Spanish 23 or the equivalent, and course 1 or Spanish 132. Chicano features of the varieties of the Spanish lan-
guage spoken throughout the United States: phonology, morphology, syntax, vocabulary. The main focus is the relationship between United States Spanish and other world varieties of Spanish, within a historical framework.

120. Semantics (4) I. Ojeda Lectures—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the study of meaning; the nature of the linguistic sign, the structure of the lexicon, and the semantics of sentences.

*135. Introduction to Psycholinguistics (4) III. Lapointe Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

139. Phonological Analysis (4) II. Brentari Lecture—3 hours; discussion—1 hour. Prerequisite: course 103. Introduction to and application of phonological theory.

140. Grammatical Analysis (4) I. Farrell, Lapointe Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to syntactic analysis; survey of types of syntactic and semantic phenomena in natural languages. Emphasis will be on developing skills and data analysis, rather than on investigating formal aspects of the theoretical framework to be employed.

142. Morphology (4) III. Lapointe, Farrell Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components.

146. Introduction to Phonological Theory (4) III. Brentari Lecture—3 hours; discussion—1 hour. Prerequisite: course 120. Introduction to contemporary phonological theory, with emphasis on autosegmental, metrical, and lexical theory.

155. Introduction to Syntactic Theory (4) III. Farrell, Lapointe Lecture—3 hours; discussion—1 hour. Prerequisite: course 139. Introduction to syntactic theory, primarily through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and theory building.

196. Current Theories of Syntax (4) II. Ojeda, Farrell, Lapointe Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Examination of major contemporary theories of syntax.

170. Language Universals and Typology (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 165. An introduction to the classification of languages in terms of their structural features, and to some of the universal properties of grammatical structures. Comparison with English.

*172. Language Structures (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: courses 102, 139, 140. In-depth study of the structure of a particular language or a collection of a language family or area. May be repeated for credit.

175. Biological Basis of Language (4) III. Driggers 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.

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 involving 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) Individual 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. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing with linguistics major 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) II, III. The Staff (Chairperson in charge) Prerequisite: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (P/NP grading only.)

Graduate Courses


209. Advanced Phonetics (4) II. Brentari Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Exploration of the physiological basis of speech articulation and an introduction to acoustics and phonetics. Offered in alternate years.

210. Advanced Semantic Theory and Analysis (4) II. Ojeda Lecture—3 hours; term paper. Prerequisite: course 120, 140. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in alternate years.

220. Romance Linguistics (4) I. Manee-Manolou Seminar—3 hours; term paper. Prerequisite: one course from the following: courses 102, 139, 140. The development of the major Romance languages from Proto-Romance to the modern era. Selected topics in the structure of a selected Romance language. Option of focus on phonology, syntax, or historical linguistics. Offered in alternate years.

225A. Modern Linguistic Theory: Structuralism (4) II. Manee-Manolou Lecture—3 hours; term paper. Prerequisite: courses 139, 140. Survey of the development of structural linguistics from de Saussure to the 1950s. Offered in alternate years.

225B. Modern Linguistic Theory: Generative Grammar (4) III. Ojeda Lecture—3 hours; term paper. Prerequisite: courses 139, 165. Survey of the development of generative grammar and its offshoots from the 1950s to the present. Offered in alternate years.

239. Advanced Phonological Theory and Analysis (4) III. Brentari Lecture—3 hours; term paper. Prerequisite: course 139. Critical overview of current phonological theories. Offered in alternate years.

250A-250B/250C-250D. Topics in Linguistic Theory and Methods (4-4-4-4) I, II, III. The Staff Seminar—3 hours; paper. Prerequisite: graduate standing and consent of instructor. Introduction to current research in various aspects of linguistics.

*265. Advanced Syntactic Theory and Analysis (4) II. Farrell Lecture—3 hours; term paper. Prerequisite: course 165. Critical survey of contemporary theories of syntax, with concentration on functionalist theories. Offered in alternate years.

280. Theory of English as a Second Language (4) I. The Staff Lecture—3 hours; term paper. Theoretical issues that have influenced the teaching of English as a second language. Concludes with a discussion of the major psychological, sociolinguistic, and cognitive psychology and English as a second language instruction.

281. Research on Second Language Acquisition (4) I. The Staff Lecture—2 hours; laboratory—1 hour; term paper; computer projects. Prerequisite: upper division or graduate standing. Analysis of theories of 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.

285. Individual and Social Aspects of Bilingualism (4) III. Timm Lecture—3 hours; term paper. Broad overview of bilingualism, 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 (4) III. Clinic—4 hours. Prerequisite: course 300. English 301 and 302 (may be taken concurrently). Teaching classes for ESL graduate students in the UC Davis ESL Clinic in pronunciation, listening, reading, writing, and instruction. ESL graduate composition classes; tutoring foreign graduate student TAs in pronunciation; observing and critiquing off-campus ESL classes. Does not fulfill requirement toward the M.A. May be repeated for credit. (SU grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Course

300. The Teaching of English as a Foreign Language (4) I. Schleppegrell Lecture—3 hours; laboratory—3 hours. Prerequisite: English 105A or course 109 consent of instructor. Methods of teaching English to non-native speakers, stressing particularly recent linguistic methodology and techniques.

301. Materials of TESOL (4) I. Schleppegrell 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; (Phonetics, 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: course 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.

397. 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 English with priority enrollment to international student teaching assistants; course consent of 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. (SU grading only.)
Linguistics
(A Graduate Group)

Steven G. Lapointe, Ph.D., Chairperson of the Group
Group Office, 922 Sproul Hall (916-752-9932/1219)

Faculty. The Group includes faculty from seven 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 one on general linguistics. Within the general linguistics track, the following areas are emphasized: (a) grammatical and syntax, morpho-
logy, semantics, and phonology, (b) sociolinguistics, (c) psycholinguistics and neurolinguistics, and (d) linguistic description (historical or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC is intended to serve 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 lan-
geage teaching). The program is structured so as to place 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 com-
plete the following courses in Linguistics from the undergraduate program: 109 (Phonetics), 102 (Hist-
orical Linguistics), 120 (Semantics), 139 (Phonological analysis), 140 (Grammar and Syntax), an-
d 150 (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 divi-
Sional 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, thirty-six 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. L.A. Timm (Linguistics).

Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English, refer to material listed for the course description.

Chinese
10. Modern Chinese Literature (in English)
11. Great Books of China
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)
109. Paper on Chinese Literature (in English)
110. Great Writers of China: Texts and Contexts (in English)

English
140. Homer and Ancient Epic
141. Greek and Roman Comedy
142. Greek and Roman Novels
143. Greek Tragedy

Comparative Literature
1. Great Books of Western Civilization: From Greek to Latin
2. Great Books of Western Civilization: From Latin to Greek
3. Great Books of Western Civilization: The Modern Crisis
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
10-
A. Master Authors of World Literature
10-B. Introduction to Women Writers
11. Dramatic Literature
12. The Spiritual Quest
13. Men and the Natural World
21. Ethnic Minority Writers in World Literature
21-A. Literature of China and Japan
21-B. Literature of India and Southeast Asia
12. Writing Nature: 1750 to the Present
13. Women Writers
14. Gender and Interpretation
15. Themes and Structural Study of Literature
16. Literary Theory and Criticism
17. Critical Reading and Analysis
18. The Gothic
19. Representation of the City
20. Myth and Literature
21. Literature of the Americas
21-1. The Forms of American Literature
21-2. War and Peace in Literature
21-3. The Detective Story as Literature
21-A-G. Special Topics in Comparative Literature
21-A. The Modern Novel
21-B. The Modern Drama
21-C. Tragedy
21-D. Tragedy
21-E. Comedy
21-F. Biography and Autobiography
21-G. The Middle Ages
21-H. The Renaissance
21-I. Baroque and Neo-Classicism
21-J. The Enlightenment
21-K. The Epic
21-L. The Novel
21-M. Comparative Study of Major Authors
21-N. Romanticism
21-O. Realism and Naturalism
21-P. The Avant-Garde
21-Q. The Contemporary Novel
21-R. Selected Topics in Comparative Literature
195. Senior Seminar

Dramatic Art
20. Introduction to Dramatic Art
156. Theatre and Drama: Aeschylus to Machi-
avelli
157. Theatre and Drama: Shakespeare to Schiller
158. Theatre and Drama: Ibsen to Albee
159. Contemporary Experimental Theatre and Drama

English
171-A. The Bible as Literature: The Old Testament
171-B. The Bible as Literature: Prophets and New Testament

French
25. Introduction to French Literature
112. Masterpieces of French Drama
113. Masterpieces of French Novels
114. French Philosophical Literature

German
48. Myth and Saga in the Germanic Cultures
49. Freshman Colloquium
60. History of German Culture
51. Introduction to Literary Analysis
52. Great Books of German Culture in English Translation: Age of Faith
52-B. Great Books of German Culture in English Translation: Age of Reason
52-C. Great Books of German Culture in English Translation: Age of Relativity
110. Older German Literature
111A. Studies of Major Writers
111A-C. Topics in German Literature
111-D. Goethe’s Faust
114. The Faust Tradition before and after Goethe
115-A. German Literature since 1945
115-B. German Literature since 1945
116. From Goethe to the Weimar Republic
117. The Tristan Tradition: Medieval, Musical, and Modern
117-B. The Nibelungen Tradition: Medieval, Musical, and Modern
117-C. The Tristan Tradition: Medieval, Musical, and Modern
118A. Fin-de-siécle Vienna (The Swan Song of the Habsburg Empire)
118-B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nationalism
118C. Germany under the Third Reich
118D. Contemporary German Culture
119. From German Fiction to German Film
120. Modernity and Its Discontents: the Tradition of German Cultural Critique
121. German Political Culture from the Middle Ages to the Present
121. The Holocaust and Its Literary Representation
122. New German Cinema: Von Oberhausen to the Present

Italian
25. Italian Literature in Translation
25-B. Boccaccio’s Treveti and the Renaissance
25-C. Modern Italian Literature
25-D. Italian Literature in English Translation: Dante, Divine Comedy

Japanese
20. Masterworks of Japanese Literature (in English)
21. Introduction to Traditional Japanese Culture
101. Japanese Literature in Translation: The Early Period
102. Japanese Literature in Translation: The Middle Period
104. Modern Japanese Literature: War and Revolution
105. Modern Japanese Literature: Hero and Anti-Hero
106. Japanese Culture through Films
107. 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 literature and poetry)
182. Special Topics in Native American Literature

Russian
24. Survey of Nineteenth-Century Russian Literature
42. Survey of Twentieth-Century Russian Literature

*Course not offered this academic year.*
Management, School of
Robert H. Smiley, Ph.D., Dean
School Office, 106 AOR 4 (918-752-7382)

Faculty
Peter Alpert, Ph.D., Assistant Professor
Brad Barber, Ph.D., Assistant Professor
Nicole W. Biggart, Ph.D., Provost (Management, Sociology)
George Birting, Ph.D., Associate Professor
S. D. Bunch, Ph.D., Assistant Professor
Richard P. Castanias, Ph.D., Associate Professor
Peter Clark, Ph.D., Provost (Management, Electrical and Computer Engineering)
Masako Darroch, Ph.D., Associate Professor
Scott Davis, Ph.D., Assistant Professor
Richard C. Dorf, Ph.D., Provost (Management, Electrical and Computer Engineering)
Paul A. Griffin, Ph.D., Professor
Michael Hagerty, Ph.D., Associate Professor
John Lyon, Ph.D., Assistant Professor
Michael Maheswaran, Ph.D., Professor
Alexander F. McClellan, Ph.D., Professor (Agriculture, Economics)
Donald Palmer, Ph.D., Associate Professor
David M. Rui, Ph.D., Professor
John W. S. Shott, Ph.D., (Hon.), Senior Lecturer (Management, Electrical and Computer Engineering)
Donald N. Topkis, Ph.D., Professor
Chih-Ling Tsai, Ph.D., Associate Professor
Gary M. Walton, Ph.D., Professor (Management, Economics)
David Woodford, Ph.D., Assistant Professor

Courses in Management (MGT)

Lower Division Courses

11A. Elementary Accounting (4) J. I. Darrough Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles. (Former course Economics 11A.)

11B. Elementary Accounting (4) J. I. Darrough Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation. (Former course Economics 11B.)

Upper Division Course

100. Introduction to Financial Accounting (3) Griffin Lecture—3 hours. Prerequisite: good knowledge of accounting is required. 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)
The core courses are being revised subject to approval by the Graduate Council. For further information, contact the Graduate School of Management.

201A. Financial Accounting and Reporting (3) Lyon Lecture—3 hours. Introduction to the basic principles of accounting, financial reporting and policy, with special attention to the preparation, analysis, and evaluation of published corporate financial statements. Topics include accrual measurement and valuation, assets and liabilities, owner's equity and intercorporate investments.

201B. Management Accounting and Control (3) Mahler Lecture—3 hours. Prerequisite: course 201A. Provides an introduction to the preparation, analysis, and evaluation of data provided by cost accounting for management planning and control, budgeting, performance evaluation, and trend decision making.

202. Organizational Behavior (3) Palmer Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to theories of human behavior in organizations. Topics include group dynamics, leadership, power, social influence, conflict resolution, motivation, stress, decision making, and organizational culture. Consideration of alternative theoretical models.

202. Organizational Behavior (3) Palmer Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to theories of human behavior in organizations. Topics include group dynamics, leadership, power, social influence, conflict resolution, motivation, stress, decision making, and organizational culture. Consideration of alternative theoretical models.

204. Economic Analysis I (3) Castanias Lecture—3 hours. Prerequisites: graduate standing or consent of instructor; introductory knowledge of microeconomics. Economic reasoning applied to resource-allocation decisions of consumers, firms, and governmental bodies. Market forces and the price system. Corporate strategy and industrial organization.

205. Economic Analysis II (3) Birting Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 204. Continuation of course 204. Advanced analysis of the behavior of capital and labor markets, consumer externality, market failure, and public-policy responses to market failure.

206. Evaluation of Policies and Programs (3) The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Quantitative procedures for assessing the efficiency, effectiveness, policies and programs. Methodology employed includes experimentation, quasi-experimental design, time-series analysis. The advantages and limitations of various kinds of evaluation methods through case studies.

207. Financial Theory and Policy (3) Alpert Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 204. Analysis of the allocation of scarce resources by individuals, firms, and society, and when alternatives are risky. Factors which affect the valuation of risky and long-run real and financial assets. Financial policy, financial planning for profit-seeking, and not-for-profit organizations.

208. Marketing Management (3) Davis Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Marketing management process, environmental and market opportunities, elements of market research, development of marketing strategies, market planning, implementation, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, sales.

209. Computers and Information Systems (3) Topkis Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 201A. Introduction to the use of computer systems in the management of business and industry, including computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computer. Topics include the role of computer systems in organizations, human-computer interaction, and computer programming.

210A. Statistics for Management (3) Burch Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 209. Introduction to statistical methods for managers. Descriptive statistics, sampling, statistical inference, hypothesis testing.

210B. Statistics for Management (3) Burch Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 208 and 210A. Regression analysis and time series. Stresses applications of statistical analysis in public and private administration.

211. Quantitative Analysis for Decision Making (3) Burch Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 210A and 210B. Quantitative decision making. Decision analysis and mathematical modeling of complex decision processes. Linear programming, optimization, and simulation. Stresses applications of decision analysis in public and private administration.

212. Public Budgeting and Finance (3) The Staff Lecture—3 hours. Fiscal role of government in a mixed economy; federal and state finances; fundamentals of administrative law, fundamentals of business law.

220. Human Resources Management (3) Biggart Lecture—3 hours. Problems of recruiting, training, motivating, compensating, and separating workers. Contemporary organizations. Topics include design of incentive systems, career management, personnel decisions, 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.

226. Statistical Quality Control and Productivity Improvement (3) Burch Lecture—3 hours. Prerequisite: courses 201A and 210A or the equivalent. 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.

229. 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.

234. Regulation and Policy in Agriculture (3) The Staff
Lecture—3 hours. Implications for management of regulation and public policy agricultural production, marketing, processing, and marketing; influences on management strategy, organization, business practices, and resource productivity; trends in regulation and policy and their potential for management policies are explored.

240. Management Policy (3) Suran
Lecture—3 hours. Integrative examination of managing the total organizational enterprise. Mission, objectives, strategies, policies, measurements, and control.

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 Small and Business Ventures (3) Dorf
Lecture—3 hours. Emphasizes starting a new business venture, 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.

246. Negotiation and Team Building (3) III. Hagerty
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 claim-making nature, how to negotiate bargaining terms, uncovering hidden agendas, brain-storming to extend Pareto frontier.

248. Marketing Strategies (3) Hagerty
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 functions. Applications to problems in private and public sector marketing.

249. Marketing Research (3) Hagerty
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. Emphasizes practical 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, queuing, and network models.

260. Financial Management (3) Cassarino
Lecture—3 hours. Financial 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. Explores modern asset pricing theory and the implications of that theory for the analysis and management of stocks, bonds, and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are discussed from the perspective of a portfolio fund manager.

262. Money and Security Markets (3) Bittingner
Lecture—3 hours. Examines how money and securities markets influence the price of public agencies, businesses, others obtain and invest funds in these markets. Relationship between interest rates, money policy, government's role in improving capital markets, and the case for assessing changes in regulation in specific markets.

263. Options and Futures Markets (3) Barber
Lecture—3 hours. Studies the behavior of options and futures markets; how public agencies, businesses, others use these markets. Studies nature of various strategies involving options, commodity, financial futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) Blumenthal

265. Theory of Financial Decision Making (3) Cassarino
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

266. International Finance (3) Cassarino
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

267. The National and International Economy (3) Clark
Lecture—3 hours. Prerequisite: familiarity with basic macroeconomic concepts is required. Completion of an introductory course in macroeconomics is sufficient, but additional course can be helpful. Open to Graduate School students; non-GSIM graduate students may enroll with consent of instructor. Provides a framework for the analysis of aggregate output, interest rates and the price level within the United States, and the linkages between U.S. economy to the economies of the rest of the world through the exchange rate and international trade.

268. Management Communications (3) Kennedy
Lecture—3 hours. Emphasizes strategies, and skills necessary for effective communication in management. Students will learn to improve their business writing, and will deliver business presentations orally.

269. Case Studies in Corporate Finance (3) Barber
Lecture—3 hours. Prerequisite: course 201A, 207. Financial issues facing firms with a need to raise capital in financial markets. Unique course format uses case studies to analyze decisions which firms face.

270. Corporate Financial Reporting (3) Griffen
Lecture—3 hours. Course evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investors, management, and accounting policy makers.

271. Accounting and Budgeting for Management Control (3) Marks
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) Griffen
Lecture—3 hours. Studies how investors, creditors, other users accounting and other information in making rational investment, lending, and financing 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 Governmental and Nonprofit Entities (3) Maher
Lecture—3 hours. Emphasis on 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 aperspective of an auditor. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

275A-275B. Seminar in Finance and Accounting (3-3) III. Casarino, Barber, Lyon

276. Real Estate, Finance and Development (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210A 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. Consideration of 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, inventory control, marketing, and financial decision making.

286. Telecommunications and Computer Networks (3) Topkis
Lecture—3 hours. Prerequisite: course 280. Communication system components, common carrier services, design and their uses within organizations; applications network; 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 structure and languages. Integrity and security. Application to managerial decision making and decision support systems.
Master of Education (M.Ed.) (A Graduate Group)

James Grieshop, Ph.D., Chairperson of the Group Office, 1303 Hart Hall (916-752-1096).

Faculty, This interdisciplinary graduate group consists of faculty from departments such as Agricultural Engineering, Applied Behavioral Sciences, Community Health, Consumer Science, Division of Education, Environmental Design, Environmental Horticulture, Human Development, Native American Studies, Nutrition, Plant Science, Psychology, Rhetoric and Communication, Textiles and Clothing, and Vegetable Crops.

Graduate Study, The Master of Education Graduate Group is housed in the Department of Applied Behavioral Sciences. 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 decision making; leadership development, communication and change; extension education; environmental education; agricultural development education; and consumer behavior.

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 8 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.

Mathematics

College of Letters and Science

Henry L. Alder, Ph.D., Chairperson of the Department
Joel Hass, Ph.D., Vice-Chairperson of the Department (Graduate Matters)
Angela Y. Cheer, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)
Department Office, 565 Kerr Hall (916-752-0537)

Faculty

Henry L. Alder, Ph.D., Professor, Academic Senate Distinguished Teaching Award
David W. Barnett, Ph.D., Professor

David J. Barsky, Ph.D., Assistant Professor
Carlos L. Borros, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Gulbank C. Daghlian, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Angela Y. Cheer, Ph.D., Associate Professor
Doyle O. Cutler, Ph.D., Professor
James R. Decker, Ph.D., Professor
Allan L. Edelson, Ph.D., Professor
Alice Fialkowski, Ph.D., Associate Professor
Dimitri B. Fuchs, Ph.D., Professor
Janko Granveld, Ph.D., Assistant Professor
Joel Hass, Ph.D., Associate Professor
John K. Hunter, Ph.D., Professor
Kurt Kriegl, Ph.D., Professor
Arthur J. Kremer, Ph.D., Professor
Rong-Chung Lin, Ph.D., Assistant Professor
E. O. Milton, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Mototsugu Morise, Ph.D., Professor
Washek F. Pfeffer, Ph.D., Professor
E. Perry Pickett, Ph.D., Assistant Professor
Jeremy D. Quastel, Ph.D., Assistant Professor
G. Thomas Salles, Ph.D., Professor
Albert Schwarz, Ph.D., Ph.D.
Evelyn M. Silvia, Ph.D., Professor, Academic Senate Distinguished Teaching Award
David M. Stuart, Ph.D., Assistant Professor
J. Blake Temple, Ph.D., Professor
Abigail Thompson, Ph.D., Assistant Professor
Craig A. Tracy, Ph.D., Professor
Howard J. Weiner, Ph.D., Professor
Roger J. Welt, Ph.D., Professor

Emeriti Faculty

Hubert A. Arndt, Ph.D., Professor Emeritus
George A. Baker, Ph.D., Professor Emeritus
Dallas O. Banks, Ph.D., Professor Emeritus
Donald C. Benson, Ph.D., Professor Emeritus
Albert C. Burdette, Ph.D., Professor Emeritus
Curtis M. Furey, Ph.D., Professor Emeritus
Robert D. Glaz, Ph.D., Professor Emeritus
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Melvin R. Krom, Ph.D., Professor Emeritus
Gary J. Kuroki, Ph.D., Professor Emeritus
David E. Mead, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Donald A. Norton, Ph.D., Professor Emeritus
Edward B. Roessler, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Sherman K. Stein, Litt.D. (hon.), Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award

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 course such as calculus, students plan an upper division program in consultation with a faculty advisor. 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:

Preparatory Subject Matter
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 ...6

Core Requirements
Mathematics 108 ...4
Mathematics 127A, 127B ...8
Mathematics 149A, 149B, or 150A, 150B ...8
Students may choose one Track from the following two...16

Track 1: Secondary Teaching
Mathematics 115A ...3
Mathematics 143 ...3
Additional upper division units ...10

Track 2: General Mathematics
Additional upper division units ...16
Total Units for the Major ...73-77

B.S. Major Requirements:

Preparatory Subject Matter
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) ...3-4

Core Requirements
Mathematics 108 ...4
Mathematics 127A, 127B ...8
Choose one Track from the following four ...33

Track 1: Preparation for Graduate Study in Mathematics
Mathematics 127C ...4
Mathematics 150A, 150B, 150C ...12
One course from Mathematics 126, 126, 147 ...3

Additional upper division units ...14
Recommended: Mathematics 118A, 118B, 118C, 119, 125, 126, 141, 147, 185A, 185B.

Track 2: Applied Mathematics
Mathematics 150A, 150B ...8
Mathematics 167 ...3
Two courses from Mathematics 128A, 128B, 128C ...8

Additional upper division units ...14
Recommended: Mathematics 118A, 118B, 119, 125, 147, 185A, 185B; Statistics 131 or Mathematics 131A, Computer Science Engineering 110, 122, up to 8 units of courses outside of mathematics department related to area of interest.

Track 3: Mathematics for Secondary Teaching Mathematics 115A, 115B, 115C, 115D ...3
Mathematics 149A, 149B, or 150A, 150B ...8
Additional upper division units ...19

Track 4: General Mathematics
Mathematics 149A, 149B, or 150A, 150B ...8
Additional upper division units ...25
Total Units for the Major ...75-86

*Course not offered this academic year.
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 if only sufficient number of students enroll. Nonmat 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 if only 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 (I, II, III). The Staff Lecture—3 hours. Prerequisite: Two years high school algebra, geometry, plane trigonometry, or equivalent. Functions and graphs, polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, and analytic geometry. Applications, in particular to maxima and minima problems. Not open to students who have received credit for course 21A.

16A. Short Calculus (I, II, III). The Staff Chairperson in charge

16B. Short Calculus (I, II, III). The Staff Chairperson in charge

16C. Short Calculus (I, II, III). The Staff Chairperson in charge

16D. Vector Analysis (I, II, III). The Staff Lecture—4 hours. Prerequisite: courses 21C, 22A. Applications of the calculus to physics and engineering. Functions of several variables, tangent planes, extrema, multiple integrals, line and surface integrals, Green's and Stokes' theorems, vector fields. Applications to fluid dynamics, electricity and magnetism. (Former course 22C.)

22A. Linear Algebra (I, II, III). The Staff Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms.


36. Fundamentals of Mathematics (I). The Staff Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. Introduction 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 to students who have received credit for course 108. Recommended for non-math majors.
83. Ideas from Mathematics (3) II. The Staff Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. In-depth treatment of certain 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 wish to study the deeper aspects of mathematics. Not open to students who have taken course 108.

71A-71B. Explorations in Elementary Mathematics (3-3) II-III. The Staff (Chairperson in charge) Lecture—2 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. Weinert Seminar—1 hour. Prerequisite: high school mathematics. Students solve and present solutions to challenging and interesting problems in elementary mathematics. (PNP grading only.)

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

108. Introduction to Abstract Mathematics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 21B or consent of instructor. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics accurately and briefly.

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. Alder 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. Alder Lecture—3 hours. Prerequisite: course 108. Euler function, Möbius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years.

115C. The Theory of Numbers (3) III. Alder 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, 210; 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, 210. Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace’s equation; Fourier series; method of characteristics for the one-dimensional wave equation; solution of nonhomogeneous equations.

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; eigenvalues and eigenfunctions in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson’s Equations.

119C. Partial Differential Equations: Green’s Functions and Transformations (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.


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 limit processes; 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. Krom Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicates, 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 cardinals, ordinals, type order sets, ordinal numbers. Offered in alternate years.

127A-127B-127C. Advanced Calculus (4-4-4) I-II-III. The Staff Lecture/discussion—4 hours concurrently. Prerequisites: courses 22A, 210; course 108 (may be taken concurrently with consent of instructor). Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis I (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: course 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. Numerical solution 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. Prerequisites: courses 21C and 22A. Probability space, event, combinatorics; discrete, continuous distributions; random variables; joint, marginal, conditional distributions; 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.

122A-122B. Introduction to Stochastic Processes (3-3) II-III. The Staff Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queuing 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.

170. Topology (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 108, 127A. Basic notions of point-set and combinatorial topology. Offered in alternate years.

148A-148B. Topics in Discrete Mathematics (4) II, III. The Staff (Chairperson in charge) Lecture/discussion—4 hours. Prerequisite: course 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 (isomorphisms, 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 queuing theory. Block accesses; buffer; operating system convention; CPU intensive operations.


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 transformations, 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 a constrained nonlinear programming problem, descent methods, conjugate direction method. Constrained minimization.

180. Special Topics: Pure and Applied Mathematics (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: courses 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, number theory. May be repeated for credit in different subject area.

185A. Functions of a Complex Variable with Applications (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 21D. Complex number systems, analytically and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

*Course not offered this academic year.
185B. Functions of a Complex Variable with Applications (3) I-II. 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.
Weiner 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. (PINP grading only.)

190L. 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 supervisor prior to enrollment. Supervised work experience in applied mathematics. May be repeated for credit for a total of 10 units. (PINP grading only.)

194. Undergraduate Thesis (3) I, II, III. The Staff
Prerequisite: consent of instructor. Independent research under supervision of a faculty member. Students submit written report in thesis form. May be repeated with consent of Vice Chairperson. (PINP grading only.)

197TC. Tutoring Mathematics in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours; laboratory—2-6 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education which involve the development of techniques for mathematics instruction and tutoring on an individual or small group basis. (PINP grading only.)

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

201A-201B-201C. Real and Complex Analysis (4-4-4) II-III.
The Staff
Lecture—3 hours, discussion or paper (instructor’s option); prerequisite: course 127C or 233C. Abstract integration, Lebesgue measures, LP spaces, complex measures, holomorphic functions, Cauchy’s theorem, Riemann mapping theorem, and analytic continuation.

201D. Real and Complex Analysis (4) I-II. The Staff
Lecture—3 hours, discussion—1 hour (to be arranged). Prerequisite: course 201C. Riemann mapping theorem and analytic continuation. Offered in alternate years.

202A. Functional Analysis (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 201D. Introduction to topological vector spaces. Metrization, Banach-Steinhaus theorem, the open mapping theorem, the closed graph theorem, the Hahn-Banach theorem. Duality and convexity. Weak topologies. Applications. Offered in alternate years.

202B. Functional Analysis (4) III. The Staff (Chairperson in charge)
Lecture—3 hours, discussion—1 hour. Prerequisite: course 202A. One of the following topics will be covered: (a) distributions and Fourier transforms and their applications to partial differential equations; (b) theory of bounded and unbounded linear operators and their spectral decompositions; (c) non-linear functional analysis. Offered in alternate years.

203A-203B-203C. Modern Applied Analysis (3-3-3) I-II-III.
The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Classical mathematical foundations teaching problem analysis. Linear and metric spaces; Hilbert space; operator theory. Applications to integral and differential equations. Variational methods.

204. Applied Asymptotic Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Asymptotic analysis and perturbation theory, with applications to optimization, differential equations, and scaling.

210A. Topics in Geometry (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor’s degree in mathematics, 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 courses 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) I. 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) I. The Staff (Chairperson in charge)
Lecture/discussion—1 hour (to be arranged). Prerequisite: courses 210B (concurrently); consent of instructor. Special topics related to courses 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 courses 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

213A-213B. Stochastic Dynamics and Applications (3-3) III.
The Staff
Lecture—3 hours. Prerequisite: course 210C or 235C or consent of instructor. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, martingale equations, Markov processes. Applications and advanced topics. Offered in alternate years.

215A-215B-215C. Topology (4-4-4) 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.

250A-250B-250C. Algebra (4-4-4) 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.

257. Topics in Optimization (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210B or 235B or consent of instructor. Advanced topics in the theoretical foundations of optimization and its applications, such as: linear and nonlinear systems theory, stochastic programming, stochastic optimal control, approximation theory for optimization, advanced numerical methods, applications of Markov processes, and introduction to stochastic optimization.

258A. Optimization I (3) I.
The Staff
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimality conditions, linear programming and unconstrained optimization (gradient, Newton, conjugate directions and minimum principle), convergence and rate of convergence, selected topics. Offered in alternate years.

258B. Optimization II (3) II.
The Staff
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, locally and nonlinearly constrained optimization (gradient, Newton, conjugate directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangians, sequential quadratic programming, selected topics. Offered in alternate years.

261A-261B. Mathematical Fluid Dynamics (3-3) I-II.
The Staff
Lecture—3 hours. Prerequisite: course 211B. 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.

275A-275B. Metamathematics (3-3) I-II.
The Staff
Lecture—3 hours. Prerequisite: course 126 or the equivalent. Axiomatizability, consistency, and completeness of the formalized mathematical theories; computability in formal languages; topics from the theory of models. Offered in alternate years.

282A-282B-282C. Numerical Solution of Differential Equations (3-3-3) II-III.
The Staff

289A-289B. Numerical Methods in Linear Algebra (3-3) III.
The Staff
Lecture—3 hours. 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.

289A-289B-289C. Probability Theory (3-3-3) III.
The Staff
Lecture—3 hours. Prerequisite: course 127C and Statistics 131A-131B or the equivalent. Measure and integration foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, additional explorations into discrete and continuous time Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Statistics 239A, 239B, 239C.)

240A-240B-240C. Differential Geometry (3-3-3) II-III.
The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 116 or consent of instructor. Introduction to differentiable manifolds, the tangent bundle, vector fields, fiber bundles, DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in alternate years.

250A-250B-250C. Algebra (4-4-4) 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.

257. Topics in Optimization (3) III.
The Staff
Lecture—3 hours. Prerequisite: course 210B or 235B or consent of instructor. Advanced topics in the theoretical foundations of optimization and its applications, such as: linear and nonlinear systems theory, stochastic programming, stochastic optimal control, approximation theory for optimization, advanced numerical methods, introduction to stochastic optimization algorithms, shape optimization, large scale optimization, semi-infinite and nondifferentiable optimization with applications to engineering design, global optimizations. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 257.)

258A. Optimization I (3) II.
The Staff
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimality conditions, linear programming and unconstrained optimization (gradient, Newton, conjugate directions and minimum principle), convergence and rate of convergence, selected topics. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 258A.)

258B. Optimization II (3) III.
The Staff
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, linearly and nonlinearly constrained optimization (gradient, Newton, conjugate directions and reduced gradient algorithms, interior point methods, Lagrangian theory, duality, augmented Lagrangians, sequential quadratic programming, selected topics. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 258B.)
Medical Microbiology
See Medicine, School of

Medical Pharmacology and Toxicology
See Medicine, School of

Medicine, School of Medicine (School of) and Medicine (Veterinary Medicine)

Hugo G. Bogren, M.D., Professor (Radiology, Internal Medicine)
William J. Bommer, M.D., Professor of Clinical Internal Medicine (Internal Medicine)
H. William Bonekat, M.D., Assistant Clinical Professor (Internal Medicine)
Anne Bonham, Ph.D., Assistant Professor (Internal Medicine, Pharmacology)
John Boone, Ph.D., Associate Professor in Residence (Diagnostic Radiology)
Barbara Botehlo, M.D., Assistant Professor in Residence (Pediatrics)
Constance Bower, M.D., Assistant Professor in Residence (Neurology)
Stephen Bowes, M.D., Associate Professor (Otolaryngology and Gynecology)
E. Morton Bracbury, Ph.D., Professor (Biological Chemistry)
James Brandt, M.D., Associate Professor in Residence (Ophthalmology)
William Braut, M.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)
Hilary Brooke, M.D., Ph.D., Assistant Professor (Otolaryngology)
Tomas Bredfild, M.D., Assistant Clinical Professor (Internal Medicine, Surgery)
Richard Budenz, M.D., Ph.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)
Thomas Bullen, M.D., Assistant Clinical Professor (Pediatrics)
Michael Buonocore, M.D., Ph.D., Assistant Professor in Residence (Radiology)
Margaret S. Burns, Ph.D., Adjunct Professor (Ophthalmology)
Peter M. Cala, Ph.D., Professor (Human Physiology)
Edward J. Callahan, Ph.D., Professor (Family Practice)
Robert A. Cannon, M.D., Associate Professor (Pediatrics)
Robert D. Carroll, M.D., Ph.D., Professor (Pathology), Academic Senate Distinguished Teaching Award
George H. Cardinet III, D.V.M., Ph.D., Professor (Physical Medicine and Rehabilitation)
Richard C. Carsten, Ph.D., Professor (Human Physiology)
James R. Cartwright, Ph.D., Associate Professor in Residence (Pathology, Internal Medicine)
Cameron Carter, M.D., Assistant Professor (Otolaryngology)
Gregory Carter, M.D., Assistant Professor of Clinical Physical Medicine and Rehabilitation (Physical Medicine and Rehabilitation)
James J. Castles, Jr., M.D., Professor (Internal Medicine)
Minyuan Chang, M.D., Assistant Professor in Residence (Radiology)
R. Jeffrey Chang, M.D., Professor (Obstetrics and Gynecology)
Michael W. Chapin, M.D., Professor (Orthopaedic Surgery)
Ashram Chehrazi, M.D., Professor (Neurological Surgery)
Anthony Cheung, Ph.D., Adjunct Professor (Pathology)
Richard A. Chole, M.D., Ph.D., Professor (Otolaryngology)
Michael Choy, M.D., Assistant Professor in Residence (Pediatrics)
Thomas Chu, M.D., Assistant Professor in Residence (Ophthalmology)
Ronald Y. Chuang, Ph.D., Professor in Residence (Pharmacology)
Terry L. Coates, M.D., Assistant Professor of Clinical Radiology (Radiology)
Kent Cochrum, D.V.M., Associate Adjunct Professor (Surgery)
Stuart H. Cohen, M.D., Associate Professor (Internal Medicine)
Matthew H. Conner, M.D., Associate Professor (Pediatrics)
Michael Costa, M.D., Assistant Professor of Clinical Pathology (Pathology)
Carroll C. Cross, M.D., Professor (Internal Medicine, Human Physiology)
Fitz-Roy E. Curry, Ph.D., Professor (Human Physiology)

Gerald S. Lazarus, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
John R. Elliott, Assistant Dean
F. William Blaisdell, M.D., Acting Assistant Dean
Kendall A. Bagby, M.D., Associate Dean
Frank J. Loşe, M.D.A., Associate Dean
Brian O'Neil, M.D., Assistant Dean
Donald A. Walsh, Ph.D., Associate Dean
Dean's Office, Medical Sciences 1C (916-752-0331)

Faculty
Deborah A. Abin, M.D., Assistant Professor of Clinical Radiology (Radiology)
Mark Aguiat, M.D., Assistant Professor (Neurology)
Timothy Albertson, M.D., Ph.D., Associate Professor (Otolaryngology and Gynecology)
Robbee Allen, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Eugenio Amparo, M.D., Associate Professor in Residence (Neurology)
Ezra A. Amsterdam, M.D., Professor (Internal Medicine)
Thomas Anders, M.D., Professor (Psychiatry)
Mark Anderson, M.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)
Russell Andrews, M.D., Associate Professor in Residence (Neurological Surgery)
Joseph Anaglou, M.D., Assistant Professor in Residence (Anesthesiology)
Thomas Ade, M.D., Professor (Internal Medicine)
C. Robert Ashmore, Ph.D., Professor (Physical Medicine and Rehabilitation)
Huqng Bach, M.D., Assistant Clinical Professor (Internal Medicine)
Giacomo Bascur, M.D., Associate Professor in Residence (Surgery)
Félix Battistella, M.D., Assistant Professor in Residence (Surgery)
Blaine A. Bean, M.D., Professor (Medical Microbiology and Immunology)
Carol Beatty, M.D., Assistant Professor of Clinical Radiology (Radiology)
James J. Beaumont, Ph.D., Assistant Professor in Residence (Internal Medicine)
Dennis J. Beckley, M.D., Assistant Professor of Clinical Neurology (Clinical Neurology)
Mahamoud Benbarka, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
John R. Benfield, M.D., Professor (Surgery)
William F. Benitez, Ph.D., Professor (Biological Chemistry)
Henry Bennett, Ph.D., Associate Professor of Clinical Anesthesiology (Anesthesiology)
Daniel R. Benson, M.D., Professor (Orthopaedic Surgery)
Ramon Bergner, M.D., Assistant Professor (Surgery)
Herbert Berktof, M.D., Professor in Residence (Surgery)
Brian Berman, M.D., Ph.D, Professor in Residence (Dermatology)
Edmund M. Bernauer, Ph.D, Professor (Physical Medicine and Rehabilitation)
Kiaa A. Bertakis, M.D., Associate Professor (Family Practice)
F. William Blaisdell, M.D., Professor (Surgery), Academic Senate Distinguished Teaching Award
James E. Boggan, M.D., Associate Professor (Neurological Surgery)

"259. Optimal Control, Theory and Algorithms (3) I. The Staff Lecture—3 hours. Prerequisite: graduate standing. Optimal control and calculus of variations; existence of solutions to optimal control problems; necessary conditions of optimality, Pontryagin maximum principle, Euler equation; sufficient conditions of optimality, Hamilton-Jacobi-Bellman equation, linear quadratic regulator problem; algorithms for unconstrained and constrained optimal control problems. Offered in alternate years. (Same course as Electrical and Computer Science Engineering 259.)

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 in different subject areas.

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 semigroups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Advanced study in various fields of mathematics, including the following: algebraic: theory of semigroups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Advanced study in various fields of mathematics, including the following: algebraic: theory of semigroups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) Advanced study in various fields of mathematics, including the following: algebraic: theory of semigroups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (SU grading only.)

Professional Courses
300A. The Teaching of Mathematics, K-9 (3) I. The Staff Lecture, discussion, laboratory, and field work—2-6 hours. Prerequisite: senior or graduate standing, simultaneous teaching experience, and sufficient background for the successful completion of the mathematics portion of the Commission for Teaching Preparation. Mathematics curriculum and teaching methods for grades K-9. Arrangements for enrollment in the course must be made at the beginning of the fall quarter through the Education Division.

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 teaching techniques, analysis of tests and supporting material, preparation and grading of examinations, and related topics. Required of department teaching assistants. May be repeated for credit. (SU grading only.)
Karen L. Lindfors, M.D., Associate Professor in Residence (Radiology)
Daniel P. Link, M.D., Professor (Radiology)
Robert G. Longabaugh, M.D., Assistant Professor in Residence (Anesthesiology)
Bo Lonnerdal, Ph.D., Professor (Internal Medicine)
John C. Longhurst, M.D., Professor (Internal Medicine)
Samuel Louie, M.D., Assistant Professor in Residence (Internal Medicine)
Paul A. Luicci, Ph.D., Associate Professor in Residency (Pathology)
Hugh T. MacKay, M.D., Assistant Professor of Clinical Obstetrics and Gynecology (Obstetrics and Gynecology)
Malcolm R. Merz-Kenzie, M.D., Professor (Internal Medicine)
Richard J. Maddock, M.D., Assistant Professor (Psychiatry)
Sudesh Mallick, M.D., Professor (Pediatrics)
Mark J. Mannis, M.D., Professor (Ophthalmology)
Richard A. Marder, M.D., Associate Professor in Residence (Orthopaedic Surgery)
Linda Margules, M.D., Assistant Professor of Clinical Ophthalmology (Ophthalmology)
Robert C. Marshall, M.D., Associate Professor in Residence (Anesthesiology)
Robert Bruce Martin, Ph.D., Professor in Residence (Orthopaedic Surgery)
Ricardo Maselli, M.D., Associate Professor in Residence (Neurology)
Harry R. Matthews, Ph.D., Professor (Biological Chemistry)
Joseph G. Matthews, II, M.D., Assistant Professor in Pathology (Orthopaedic Surgery)
Robert E. McCabe, M.D., Associate Professor in Residence (Internal Medicine)
John McCann, M.D., Associate Professor of Clinical Anatomical Pathology (Pathology)
Michael Misch, Ph.D., Assistant Adjunct Professor (Pathology)
Stephen A. McCurdy, M.D., Assistant Professor in Residence (Pathology)
Craig McDonald, M.D., Assistant Professor of Clinical Physical Medicine and Rehabilitation (Physical Medicine and Rehabilitation)
Ruth McCullough, M.D., Assistant Professor (Pediatrics)
John McGaha, M.D., Professor (Radiology)
Michael G. McGrath, Ph.D., Associate Adjunct Clinical Professor (Anatomy)
Robert McLain, M.D., Assistant Professor in Residency (Orthopaedic Surgery)
Stanley Meisler, Ph.D., Professor of Cell Biology and Human Anatomy
Norman Melnikov, M.D., Assistant Professor of Clinical Family Practice (Family Practice)
Janet Mentink, Ph.D., Lecturer (Family Practice)
Ayala Mergia, Ph.D., Assistant Adjunct Professor (Pathology)
Thurman A. Merrill, M.D., Professor (Pediatrics)
Frederick J. Meyers, M.D., Associate Professor (Internal Medicine, Pathology)
Claraee M. Miller, Ph.D., Professor of Clinical Pathology, Internal Medicine (Clinical Pathology, Internal Medicine)
Jay M. Milstein, M.D., Associate Professor in Residence (Pediatrics)
Anne E. Missavage, M.D., Assistant Professor in Residence (Ophthalmology)
Connie Mitchell, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
H. David Moehring, M.D., Assistant Professor of Clinical Orthopaedic Surgery (Orthopaedic Surgery)
Paul Mole, Ph.D., Associate Professor (Physical Education)
Elizabeth Moore, Associate Professor (Radiology)
Peter Moore, M.B.B.S., Associate Professor of Clinical Anesthesiology (Anesthesiology)
Michael Moran, M.D., Assistant Professor in Residence (Pathology)
Walter Morgan, M.D., Associate Professor of Clinical Family Practice (Clinical Family Practice)
David Morris, Ph.D., Assistant Adjunct Professor (Neurology)
James Morrison, M.D., Associate Professor in Residence (Psychiatry)
Thomas L. Morrison, Ph.D., Professor in Residence (Psychiatry)
Lawrence Morse, M.D., Assistant Professor in Division of Radiology (Radiology)
Dan Munagas, Ph.D., Assistant Adjunct Professor (Community and International Health)
Jerome Murphy, M.D., Assistant Professor in Residence (Internal Medicine)
Tsunoru Nakada, M.D., Professor in Residence (Neurology)
Steven T. Nakajima, M.D., Assistant Professor in Division of Radiology (Radiology)
William Nemzek, M.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)
Thomas Nesbit, M.D., Assistant Professor of Clinical Family Practice (Family Practice)
Denyse Niebo, M.D., Assistant Clinical Professor (Internal Medicine)
Thomas E. Nordahl, M.D., Ph.D., Assistant Professor (Psychiatry)
Robert H. Noth, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
James Nuovo, M.D., Assistant Professor of Clinical Family Practice (Family Practice)
Martha O'Connell, Ph.D., Assistant Adjunct Professor (Human Physiology)
Lori F. O'Grady, M.D., Professor (Internal Medicine), Academic Senate Distinguished Teaching Award
Padraig O'Neill, M.D., Assistant Professor in Residence (Neurology)
Peter Ofteodahl, M.D., Assistant Clinical Professor (Surgery)
Richard H. Os, M.D., Professor of Clinical Obstetrics and Gynecology (Obstetrics and Gynecology, Pathology)
Claudio Orgain, M.D., Professor in Residence in Surgery
James W. Overstreet, M.D., Ph.D., Professor (Human Anatomy, Obstetrics and Gynecology)
Roman Pachuleski, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
John M. Palmer, M.D., Professor (Urology)
Edward Panader, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Demospheres Papaparas, M.D., Professor (Medical Microbiology and Immunology)
Conrad Parras, M.D., Assistant Professor (Neurological Surgery)
Mark Parrish, M.D., Associate Professor (Pediatrics)
Andrew Parsons, M.B.B.S., Assistant Professor of Pediatrics (Pediatrics)
Gibbe H. Parsons, M.D., Professor (Internal Medicine)
Edith Perez, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Richard Perez, M.D., Assistant Professor in Residence (Surgery)
William Pevec, M.D., Associate Professor (Pathology)
Delia Phillips, M.D., Assistant Clinical Professor (Family Practice)
Theodore Phillips, M.D., Professor (Surgery)
Stephen D. Phinney, M.D., Ph.D., Assistant Professor in Residence (Internal Medicine)
Ninelle P. Pimstone, M.D., Professor (Internal Medicine)
Margaret Pollock, M.D., Assistant Professor in Residence (Surgery)
Virginia C. Poirier, M.D., Assistant Professor of Clinical Radiology (Clinical Radiology)
Ernesto Pol lott, M.D., Assistant Professor (Pediatrics)
Jerry Powell, M.D., Associate Professor in Residence (Internal Medicine)
Thomas R. Prichard, M.D., Assistant Professor in Residency (Internal Medicine)
Carmi Puckett, M.D., Associate Professor (Neurology)
Geoff T. Rab, M.D., Professor (Orthopaedic Surgery)
Lawrence Rabinowitz, Ph.D., Professor (Human Physiology)
Michael Reilly, M.D., Assistant Professor in Residence (Neurology)
Stanley B. Reich, M.D., Professor in Residence (Radiology)
Debra Reilly, M.D., Assistant Professor in Residence (Surgery)
John A. Reitan, M.D., Professor (Anesthesiology)
Michael P. Remler, M.D., Professor in Residence (Neurology)
Eugene M. Renkin, Ph.D., Professor (Human Physiology)
Kenneth J. Rhee, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Carol Richman, M.D., Associate Professor in Residence (Internal Medicine)
David P. Richman, M.D., Professor (Neurology)
Mary Rippon, M.D., Assistant Professor of Clinical Surgery (Surgery)
Dick B. Robbins, M.D., Professor (Internal Medicine)
John A. Robbins, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Gary Roberts, M.D., Assistant Clinical Professor (Internal Medicine)
Lynn Robertson, Ph.D., Associate Adjunct Professor (Neurology)
Cynthia Rosin, M.D., Assistant Professor in Residence (Internal Medicine)
Juan J. Rodrguez, M.D., Professor (Orthopaedic Surgery)
Patrick Romano, M.D., Assistant Professor in Residence (Internal Medicine)
Nicholas Rosenlicht, M.D., Assistant Professor in Residency (Psychiatry)
Carl U. Rosengard, M.D., Professor (Radiology)
Alan M. Roth, M.D., Professor (Ophthalmology, Pathology)
Frederick Rose, M.D., Assistant Professor in Residence (Pediatrics)
Monika Royse, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Robert B. Rucker, Ph.D., Professor (Biological Chemistry)
Douglas Rusdell, M.D., Assistant Clinical Professor (Internal Medicine)
Boris Rusnber, M.D., Professor (Pathology)
Michael Russel, M.D., Associate Professor of Clinical Anesthesiology (Anesthesiology)
John Rutledge, M.D., Associate Professor in Residence (Paediatric Surgery)
Amira Salwa, M.B.B.C.A., Professor of Clinical Anesthesiology (Clinical Anesthesiology)
Steven J. Samuels, Ph.D., Associate Adjunct Professor (Internal Medicine, Obstetrics and Gynecology)
Kathleen Szmara, J.D., Associate Professor of Clinical Pathology (Pathology)
Saul Schaefer, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)
Marc B. Schenker, M.D., Professor (Internal Medicine)
James Schilling, Ph.D., Associate Adjunct Professor (Biological Chemistry)
Thomas W. Schlech, Ph.D., Adjunct Professor (Chemistry)
Barbara Schneeman, Ph.D., Professor (Internal Medicine)
Ivan Schwab, M.D., Associate Professor of Clinical Ophthalmo (Ophthalmology)
Robert J. Scioli, M.D., Associate Professor (Medical Microbiology and Immunology)
Robert P. Scooby, Ph.D., Professor (Human Physiology, Neurology, Ophthalmology)
Sidney A. Scudder, M.D., Assistant Professor in Residence (Hematology, Oncology)
James A. Seibert, Ph.D., Associate Professor in Residency (Pediatrics)
Craig W. Senders, M.D., Associate Professor (Otolaryngology)
Mark Servis, M.B.B.S., Assistant Professor of Clinical Psychiatry (Psychiatry)
Masud Seyed, M.B.B.S., Associate Professor (Neurology)
Azad A. Sheik, M.B.B.S., Assistant Professor of Clinical Pediatrics (Pediatrics)
David Shellton, M.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)
Alan D. Sheiner, M.B., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Karen A. Sigvardt, Ph.D., Associate Adjunct Professor (Neurology)
Joseph Silva, M.D., Professor (Internal Medicine)
Lorraine Smith, M.D., Assistant Professor of Clinical Radiology (Diagnostic Radiology)

*Course not offered this academic year.
Lloyd Smith, M.D., Associate Professor in Residence (Obstetrics and Gynecology)
Elizabeth M. Smith-Mitch, M.D., Professor (Pediatrics)
J. Stuart Soeldner, M.D., Professor (Internal Medicine)
Robert C. Stadler, M.D., Professor (Radiology)
Larry G. Stark, Ph.D., Professor (Pharmacology)
Charles L. Stebbins, Ph.D., Assistant Professor in Residence (Internal Medicine, Human Physiology)
David C. Stetson, M.D., Assistant Professor in Residence (Orthopaedic Surgery)
Judith Stern, Ph.D., Professor (Internal Medicine)
Thomas Stevenson, M.D., Associate Professor (Obstetrics and Gynecology)
Margaret S. Stewart, Ph.D., Professor (Psychiatry)
Dennis Stewa, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Charles Stice, M.D., Assistant Clinical Professor (Obstetrics and Gynecology)
Anthony R. Stone, M.D., Assistant Professor (Urology)
Dennis Stine, M.D., Professor (Pediatrics)
Arturo Swioklo, M.D., Assistant Professor in Residence (Internal Medicine)
Glenn T. Symes, Ph.D., Associate Professor in Residence (Orthopaedic Surgery)
Jonathan Symson, M.D., Professor of Clinical Otolaryngology (Otolaryngology)
Michael Syvanyan, Ph.D., Professor (Medical Microbiology and Immunology)
Robert M. Szanto, M.D., Associate Professor (Orthopaedic Surgery)
Robert C. Tait, Ph.D., Associate Adjunct Professor (Neurology)
Jeffrey L. Tani, M.D., Associate Professor (Family Practice)
Raymond L. Tepliz, M.D., Professor (Pathology)
Suzanne Feuer, M.D., Assistant Professor in Residence (Internal Medicine)
Seth Thrall, M.D., Assistant Professor in Residence (Surgery)
R. Steven Thranart, Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Jerold H. Theis, D.V.M., Ph.D., Professor (Medical Microbiology and Immunology)
Laura Thimeman, M.D., Assistant Professor in Residence (Orthopaedic Surgery)
Jose Torres, Ph.D., Assistant Adjunct Professor (Medical Microbiology and Immunology)
Kevin Tracy, M.D., Assistant Clinical Professor (Pedi-
 Robert R. Traut, Ph.D., Professor (Biological Chemistry)
John D. Trefeth, M.D., Professor (Obstetrics and Gynecology)
Frederic A. Troy II, Ph.D., Professor (Biological Chemistry)
Walter Trudeau, M.D., Professor of Clinical Internal Medicine (Internal Medicine)
Brian Tseng, M.D., Assistant Clinical Professor (Anesthesiology)
Samuel Tunsis, M.D., Assistant Clinical Professor (Anesthesiology)
Judith L. Turgeon, Ph.D., Professor (Human Physiology)
Catherine Vanderveen, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Richard J. Valente, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
David Vera, Ph.D., Assistant Adjunct Professor (Rheumatology)
Zakaudin Vera, M.D., Associate Professor (Internal Medicine)
Vijaya K. Vijayan, M.D., Ph.D., Professor (Human Anatomy, Neurology)
Ampare Vialblancas, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Philip J. Vogt, M.D., Assistant Professor of Clinical Pathology (Clinical Pathology)
Franklin C. Wagner, M.D., Professor (Neurological Surgery)
Donal A. Walsh, Ph.D., Professor (Biological Chemistry)
Robert M. Walter, Jr., M.D., Associate Professor (Internal Medicine) (Academic Senate Distinguished Teaching Award)
Richard F. Walters, M.D., Professor (Family Practice)
William Wara, M.D., Professor in Residence (Surgery)
John Weigel, M.D., Assistant Clinical Professor (Internal Medicine)
Robert Weiss, M.D., Assistant Professor (Internal Medicine)
Jeanne Welborn, M.D., Assistant Professor in Residence (Internal Medicine)
Richard P. Wendborg, M.D., Professor (Pediatrics)
Robert T. Wertz, M.D., Adjunct Professor (Neurology)
Ronald G. Wheeland, M.D., Associate Professor in Residence (Dermatology)
Mark Wheeler, M.D., Assistant Professor in Residence (Surgery)
Thomas P. Whez tel, M.D., Assistant Professor in Resi-
dence (Surgery)
David A. White, M.D., Associate Professor in Residence (Obstetrics and Gynecology)
Hibbsivid Williams, M.D., Professor (Internal Medicine)
Mark C. Williams, M.D., Assistant Professor in Residence (Internal Medicine)
Lowell D. Wilson, M.D., Ph.D., Professor (Internal Medicine, Biological Chemistry)
Sharon Wilson, M.D., Assistant Clinical Professor (Internal Medicine)
Mark Wineinger, M.D., Assistant Professor (Physical Medicine and Rehabilitation)
Garen Wurtermore, M.D., Associate Professor (Community and International Health)
Wallace D. Winters, M.D., Ph.D., Professor (Anesthesiology, Pharmacology)
David R. Wisor, M.D., Associate Professor in Residence (Internal Medicine)
Hansperter Witschi, M.D., Professor in Residence (Internal Medicine)
Bruce W. Witschi, M.D., Professor in Surgery (Surgery)
David W. Woods, Ph.D., Associate Adjunct Professor (Neurology)
Reen Wu, Ph.D., Associate Professor in Residence (Internal Medicine)
Theodore Wu, M.D., Assistant Clinical Professor of Internal Medicine (Internal Medicine)
Jerome Zeidis, M.D., Associate Professor (Internal Medicine)
Vincent Zibuh, Ph.D., Professor (Dermatology, Biological Chemistry)
Emeriti Faculty
Charles F. Ablidegaard, M.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. Bump, Ph.D., Professor Emeritus
Eli Benjamini, Ph.D., Professor Emeritus
Kay H. Blacker, M.D., Professor Emeritus
Robert J. Bolt, M.D., Professor Emeritus
Nemot G. Borhani, M.D., Professor Emeritus
Marion A. Cames, M.D., Professor Emeritus
William C. Canell, M.D., Professor Emeritus
Robert S. Chang, M.D., D.Sc., Professor Emeritus
Loring F. Chapman, Ph.D., Professor Emeritus
Gerald L. DeNardo, M.D., Professor Emeritus
Pierre M. Dreyfus, M.D., Professor Emeritus
William M. Dowling, M.D., Professor Emeritus
Michael C. Geokas, M.D., Professor Emeritus
Ellio Gold, M.D., Professor Emeritus
Elios Goldstein, M.D., Professor Emeritus
Edward C. Gomez, M.D., Ph.D., Professor Emeritus
Frederick W. Hanson, M.D., Professor Emeritus
Paul G. Haskins, M.D., Professor Emeritus
Glen Havelin, Ph.D., Professor Emeritus
Paul D. Hepple, M.D., Professor Emeritus
Robert L. Hunter, Ph.D., Professor Emeritus
Edward J. Hurley, M.D., Professor Emeritus
Eva K. Illing, Professor Emeritus
Alvin E. Lewis, M.D., Professor Emeritus
Paul R. Lipsomb, M.D., Professor Emeritus
George H. Lowery, M.D., Professor Emeritus
Arnold Meares, Ph.D., Professor Emeritus
Kenneth R. Niswander, M.D., Professor Emeritus
Ronan O’Rahilly, M.D., Professor Emeritus
Philip E. Palmer, M.D., F.R.C.P., Professor Emeritus
Norma G. Paton, M.D., Professor Emeritus
*Course not offered this academic year.
Medical Sciences (MDS; core courses)

Third-Year Required Courses

430. Required Surgery Clerkship (18) I, II, III, IV
The Staff
Clinical activity—full time (eight weeks); lecture—2 hour total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students are selected to medical students. Course consists of eight weeks of general surgery specialties and four weeks of orthopedics or urology. Core material is presented through seminars and lectures and reading assignments involving the workup and care of the surgical patient.

431. Medicine Clerkship (18) I, II, III, IV
Course Committee Clerkship
Clinical activity—full time (12 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 6-week periods. Direct patient care situations under guidance of full-time or volunteer faculty member. Nights and weekends. Completion of 24 fully written on patients for whom student will take special responsibility.

432A. Obstetrics-Gynecology Clerkship (12) I, II, III, IV
Course Committee Clerkship

432B. Pediatric Clerkship (12) I, II, III, IV
Course Committee Clerkship
Clinical activity—full time (6 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 3-week period, one in inpatient rotation (UCD Medical Center or Travis AFB) and one in ambulatory experience (UCD Medical Center). Assumption of appropriate patient care responsibilities; participation in conference/rounds; seminars during ambulatory rotation.

433. Clinical Clerkship in Psychiatry (12) I, II, III, IV
Course Committee Clerkship
Clinical activity—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practical, diagnostic, therapeutic, and interpersonal skills emphasized.

Fourth-Year Required Courses

440. Responsibilities of Medical Practice (3) II
Lecture and staff
Lecture/discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address psychological 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. (SU grading only.)

Fourth-Year Required Courses

Responsibilities of medical practice 2 weeks
Physical Medicine and Rehabilitation clerkship 2 weeks
Ear, Nose and Throat/Otolaryngology clerkship 8 weeks
Fourth Year Flexible Clerkships
Neurology and/or
Neurosurgery 4 weeks
Ambulatory Care 4 weeks
Clinical Electives 16 weeks

*Course not offered this academic year.

The fourth-year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.).

Other Medical Sciences Courses (MDS)

Professional Courses

401. Applications of Computers to Medical Practice (2) I, II, III, IV
Huntley
Autotutorial—9 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 on line, at home or in lab; time and place determined by student. (SU grading only.)

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. (SU grading only.)

480. Insights in Clinical Research (1) II, Walsh
Lecture—1 hour. Prerequisite: medical students in good standing. Independent research project presented by School of Medicine faculty. Overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (SU grading only.)

489. Directed Studies (9) IV
O'Grady
Independent study—40 hours weekly. Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by Promotion Board. Independent study to review material from Years I and II in the curriculum preparation for taking National Boards 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. (SU grading only.)

495. Medicine Literature Review (1-9) I, II, III, IV, Walsh
Discussion—2-3 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, ethics and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (SU grading only.)

Departmental Courses:

Anesthesiology (ANE)

Upper Division Course

192. Internship in Anesthesiology (1-6) I, II, III, IV
The Staff (Bennett, Kien)
Internship—9 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 (3-7) I, II, III, IV
Parsons in charge
Full-time clinical activity (3 full days per week). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiology and pharmacologic principles to preoperative, operative and postoperative management of patients. Concepts of choice and management of general and regional anesthetic techniques, resuscitation, artificial ventilation, analgesia and fluid-electrolyte therapy and pain problems. Students electing portions of the course for credit must receive consent of instructor. Limited enrollment.
461. Anesthesia Surgical Team Participation: Martinez VA Medical Center (6-9) I, II, III. IV. Clinical activity—full time equivalent. (3rd-4th-year medical student; completion of Medical Sciences 430. Instruction in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) monitoring of cardiovascular anesthetic conditions, (4) monitoring of cardiovascular anesthesia personnel, (5) recovery, (6) surgery requirements of anesthesia. All training is under staff direction.

Clinical activity—full time (2 weeks). Introduce medicd students to endotracheal intubation, regulation of mechanical ventilators, and training from ventilatory support.

463. Medical and Surgical Pain Management (2) I, II, III. Eisel Jr.
Clinical activity—20 hours; lecture/discussion—1 hour. Prerequisite: medical students with good standing, with consent of instructor. Rounds 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 wide range of pain conditions and management techniques. (SU grading only.)

Discussion—1 hour; laboratory—2 hours. Prerequisite: medical students with good standing, with consent of instructor. (SU grading only.)

222. Mechanisms of Transplantation Control (2) Iii.
Hershey Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 210, consent of instructor. Mucosal transplantation: Proteins, antigens, and recognition of antigens. Discussion and interpretation of data from selected patients. (SU grading only.)

259. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (PnP grading only.)

Graduate Courses
209. Prostaglandins/Lipoxigenases and Related Lipids (2) Ii. Zidden (Dermatology)
 Lecture—4 hours; Discussion—4 hours. Prerequisite: Biochemistry 210, 211, 212. Oxidative desaturation of membrane lipids. Biosynthesis and accumulation of prostaglandins, lipoxigenases, and related oxygenated fatty acids. Clinical use of prostaglandins and related lipids. (SU grading only.)

259. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (PnP grading only.)

241. Molecular Medicine (1) I. Hanley
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. (Same course as 241.)

242. Protein Structure (3) Ii. Basek
Lecture—3 hours. Prerequisite: Biochemistry 210 or consent of instructor. Course designed to acquaint students at graduate level with current application of techniques employed in determination of protein structure and significant results derived from them. Technical procedures will be presented and interpreted. Examination of protein structure and conformational dimensions of structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in alternate years. (SU grading only.)

217. Molecular Genetics of Fungi (3) Ii. Holland
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biotechnology 101B, Genetics 100, Genetics 122A, Botany 119, Pediatric 130, 215X, Microbiology 215 recommended. Advanced treatment of the molecular biology of fungi, including gene structure and organization, regulation, transcription, translation, and gene manipulation. Offered in alternate years. (SU grading only.)

288. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

289. Research Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses
410A. Molecular and Cell Biology (4.5) I. Matthews, Holland
Lecture—5 hours. Basic biochemistry of proteins and nucleic acids (presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Application to critically relevant systems is emphasized, particularly sialic cell anemia, thalassemias, immunoglobulins, and monoclonal antibodies. (SU grading only.)

410B. Cell Biology and Metabolism (3.5) I. Traut
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 biosynthesis processes in humans. Membrane receptors are considered to be part of metabolic processes. Correlations to human disease are made throughout. (SU grading only.)

414. Molecular Medicine (1) I. Hanley
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. (Same course as 241.)

418. Mammalian Endocrinology and Homeostasis (4) Iii. Wajch and staff
Lecture—4 hours; discussion—1 hour. 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 the organism, interrelationships, metabolites, and minerals. Reproductive system physiology. (Same course as Human Physiology 419.)

419. Introduction to Clinical Nutrition (3) Iii. Halstein (Internal Medicine), Rucker, and staff
Lecture—6 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: graduate student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structure relationships through dissection and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

497T. Tutoring in Biomedical Chemistry (1-5) I, II, III, IV. The Staff
Tutoring—3-5 hours. Prerequisite: advanced standing or 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. (SU grading only.)

498. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. (SU grading only.)

499. Research (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical students with consent of instructor. (SU grading only.)

Cell Biology and Human Anatomy (CHA)

Upper Division Courses
Lecture—4 hours. Prerequisite: Biological Sciences 1A or 1B, 2A or 2B. Variation in human anatomy is related to body function and structure. (SU grading only.)

101L. The Gross and Microscopic Structure of the Human Body (2) Iii.
Laboratory—2-hour sessions. Prerequisite: course 101 may be taken concurrently. Laboratory work will be taught from positions, models and slides to give students the opportunity to learn structure from dissection experience.

102. Internship in Anatomy (1-2) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

105. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Directed reading, discussion, and laboratory experience on selected topics. (SU grading only.)

109. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

109. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Graduate Courses
290. Gross Anatomy (8) I. Erickson
Lecture—3.5 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: graduate student status and consent of instructor. The course provides 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.

Course not offered this academic year.
202. Human Microscopic Anatomy (5) II. Fitzgerald Lecture—8 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 selected materials at the light microscopic and ultrastructural levels.

203. Neurobiology (6) III. Vijayan 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.

290. Seminar (1-3) II, III, IV. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

290C. Research Group Conference (1) I, II, III, IV. 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. (SU grading only.)

295. Developmental, Gross, and Radiologic Anatomy (2) IV. Erickson and staff Lecture—8 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.

400. Human Microscopic Anatomy (5) II. Fitzgerald 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.

497T. Tutoring In Human Anatomy (1-5) 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. (SU grading only.)

498. Advanced Group Study (1-12) II, III, IV. The Staff Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and laboratory experience on selected topics. (SU grading only.)

499. Research (1-12) II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

Clinical Psychology (CPS)

Graduate Course 295. Research (1-12) II, III, IV. Steward Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (SU grading only.)

Community and International Health (CMH)

Lower Division Course 92. Internship in Community Health (1-12) 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. (PAP grading only.)

Upper Division Courses

101. Perspectives in Community Health (3) II, III, IV. Boucher 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 the community.

160. Health Education (1-5) I, II, III, IV, V. The Staff (Student Health Center) Lecture—1 hour; laboratory—3 hours; seminar—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. (PAP grading only.)

180. Aging and Health (3) III, IV. Boucher 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.

192. Internship In Community Health Practice (1-12) II, III, IV. The Staff Internship—3-36 hours. Prerequisite: upper division and graduate standing; consent of instructor. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (PAP grading only.)

194. Practicum In Community Health Clinics (1-5) II, III, IV, V. Kunagali Clinical activity—3-15 hours; written report. Prerequisite: upper division standing. The undergraduate student, through active participation in the medical aspects of community health clinic, gains knowledge of their organization, administration, and problem solving capabilities of these primary care facilities. (PAP grading only.)

195. International Health Care (1) I. Boucher Seminar—1 hour. Prerequisite: one or more courses in community health, health policy, sociology, or international relations recommended. A forum for learning about current health issues and health care systems in other countries. For instance, health care for refugees, the impact of political strife on health, the role of the health care professional in international settings. May be repeated for credit. (PAP grading only.)

198. Directed Group Study (1-3) I, II, III, IV. The Staff Discussion/semiannual—5 hours; occasional visiting lecturer. Prerequisite: senior standing and consent of instructor. Directed group study on selected topics relating to community health. (PAP grading only.)

199. Research In Community and International Health (1-5) 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 economics and policy, international health and health demographics. (PAP grading only.)

Graduate Courses

294. Practicum In Community Health Clinics (1-5) I, II, III, IV. Kunagali Clinical activity—3-15 hours. Prerequisite: open to all first- or second-year medical students, or graduate students with consent of instructor. Students are assigned to clinical settings which demonstrate ethics, cultural or other related aspects of clinical community health. The students, through active participation in health care delivery, are able to relate concepts to practical aspects of primary health care. (SU grading only for graduate students.)

298. Group Study In Community Health (1-5) I, II, III, IV. The Staff Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Directed readings, discussions or community investigations in issues or problems in community health. (SU grading only for graduate students.)

299. Research In Community and International Health (1-12) 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 economics and policy, international health and health demographics. (SU grading only for graduate students.)

Professional Courses

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Haan 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 components. Evaluation of occupational illnesses, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Internal Medicine 421.)

430. Wilderness and Expedition Medicine (3.5) II. Kitzer Lecture/discussion—15 hours (for two weeks); laboratory—5 hours (for two weeks). Prerequisite: fourth-year medical students. Wilderness and expedition medicine: healthcare in health or life sciences with consent of instructor. Review of major medical problems that occur in wilderness and backcountry settings, including hypothermia and frostbite, altitude illness, animal attacks, arthropod and reptile envenomation, high altitude illness, diving and marine medicine, and wilderness rescue. (Same course as course 230.)
in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (SU grading only.)

465. Community Health Preceptorship (3-18) I, II, III, IV. Boucher Clinical activity—full time (2-12 weeks). Prerequisite: fourth-year medical students. Provides the opportunity, at the California Department of Health Services, to participate in ongoing investigations of current public health problems, i.e., birth defects, cancer control, child abuse, hypertension, injury control, infectious diseases, aging, Alzheimer’s disease, and smoking and tobacco use control.

480. Insights in Community Health (1-3) I, II, III, IV. Boucher Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Introduction to concepts involved in clinical practice of geriatrics. Participation in multi-disciplinary team conferences and teaching conferences, nursing home rounds, home health visits and hospice care, as well as other geriatric services. (SU grading only.)

499. Research in Community Health (1-9) I, II, III, IV. Staff Prerequisite: medical students only, 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 medicine, health promotion and wellness, women’s health, environmental medicine, and health demographics. (SU 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. Isseroff Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (SU grading only.)

Professional Courses

420. Integumentary System (2) IV. Hunley 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 students for their profession. 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. Wheeland Clinical activity—40 hours for four weeks (inpatient/outpatient service). 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 UCSF Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

480. Insights in Dermatology (1-3) I, II, III, IV. Wheeland 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. (SU grading only.)

498. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Wheeland 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. (SU 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. (SU grading only.)

Family Practice (FAP)

Lower Division Course

92C. Health Science Clinic Practicum (2) I, II, III, IV. Field work—in clinic setting. Prerequisite: consent of instructor. Field work in exposure to lower division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic; and appropriate referral and follow-up. (P/NP grading only.)

Upper Division Courses

192A. Internship in Family Practice (1-12) I, II, III, IV. Davidson Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Work experience supervised in the Department of Family Practice. Upper division students provided an opportunity to acquire research experience in a clinical laboratory setting. (P/NP grading only.)

192C. Health Science Clinic Practicum (2) I, II, III, IV. Arevalo Field work—in clinic setting. Prerequisite: upper division standing and consent of instructor. Field experience to introduce upper division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic; and appropriate referral and follow-up. (P/NP grading only.)

195. Health Care to Underserved Populations (1) I, II, III, IV. Nesbit Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses socio/cultural 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 (2-7) I, II, III. Hess, De Amicis Clinical activity—8-28 hours. Prerequisite: enrollment in the Master’s Track of the FNP Certificate Program. Provides opportunity to acquire the skills and knowledge necessary to diagnose and treat patients of all ages in an ambulatory care setting under the supervision of a preceptor. (P/NP grading only.)

242A-242B-242C. Clinical Role Seminar (1-1) I, II, III. Hess, De Amicis 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 Role Development (1) I, II, III, IV. Hess Seminar—1 hour. Prerequisite: B.S. degree in nursing and 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.


254. Psychosocial Concepts and Issues in Primary Care (1) I, II, III. Hess, De Amicis Seminar—1 hour. Prerequisite: B.S. degree in nursing and enrollment in the Master’s Track of the FNP Certificate Program. Examination of relevant psychosocial concepts and issues as related to primary care practice. Review of relevant research and theories related to psychosocial aspects of care of individual families. Focuses on the impact of family and individual factors on health and illness 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.

265B. Family Nursing Theory (2) III. The Staff Lecture—2 hours. Prerequisite: course 265A 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) II, III. The Staff Lecture—2 hours. Prerequisite: course 265B 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 (2) I, II, III. The Staff Lecture—4 hours. Prerequisite: course 266C and 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 presented.

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant Program.

340A-340B-340C-340D. Clinical Preceptorship for FNPPA Students (3-12) I-III. IV. Stewart, White Clinical activity—8-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Student spends 8-40 hours per week with an approved preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care and long-term care facilities.

341A-341B-341C-341D. Advanced Clinical Preceptorship for FNPPA Students (3-12) I-III. IV. Morel Clinical activity—8-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program, and course 340A-340B-340C. Student spends 8-40 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. (P/NP grading only.)

342A-342B-342C-342D-342E-342F. Inpatient Clinical Experience for FNPPA Students (5-5-5-5-5-5) I, II, III, IV, V. The Staff Clinical activity—160 hours per quarter. Prerequisite:
302. Medicine, School of

registered student in Family Nurse Practitioner/Physician Assistant Program: successful completion of course 340A-340B-340C. Student clerkship in the inpatient setting in Family Practice, Surgery, and medical/surgical subspecialty electives at UCOMC and/or affiliated institutions. Designed to expose the FNP/PA program to inpatient management; acquire student with FNP/PA role in inpatient setting. (P/NP grading only.)

345. Clinical Geriatrics (3) III. Trolinger
Clinical activity—15 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Application of principles of geriatric care in the outpatient, nursing home, acute hospital, and community settings that provide services for the elderly, including visits to patients’ homes. (P/NP grading only.)

350. Ethics and Trends in Health Care for FNP/PA Students (2) III. Trolinger
Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Trends and ethical issues in health care, review of the process and policies for ethical decision-making in patient care. These issues, trends, and practices, be related to the role of the Family Nurse Practitioner/Physician Assistant.

352A-352B. Professional Development of the Physician Assistant (1-1) II. Ill. III. The Staff
Lecture/discussion—1 hour. Prerequisite: registered student in the Physician Assistant Program. Study of the role of the physician assistant and its historical evolution, and of the organizational responsibilities and legal considerations.

354A-354B-354C. Fundamentals of Primary Health Care for FNPPA Students (5-5-4) II-II-II. The Staff
Lecture/discussion—4-4-4 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathology, diagnostic criteria and approaches to assess and manage common medical problems seen in primary health care.

355A-355B-355C. Advanced Principles of Health Care for FNPPA Students (4-4-4) III-III-III. The Staff
Lecture/discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program; course 354A-354B-354C. Study of anatomy and physiology, pathology, 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.

356. Pharmacology for FNPPA Students (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Principles of pharmacokinetics and pharmacodynamics, the classifications of drugs and representative drugs within each class, and application of these principles to pediatric and geriatric patients, and to psychiatric and obstetric patients.

360A-360B-360C. Ethics and Trends in Health Care for FNP Students (1-1-1) I-II-II. Mentink and staff
Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. The study of trends and ethics in health care, and review process and policies for ethical decision-making in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner.

362A-362B. Professional Development of the Nurse Practitioner (1-1) I, II. III. The Staff
Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program. Study of the role of the nurse practitioner and its historical evolution, and of the organizational responsibilities and legal consideration.

364A-364B-364C-364D. Behavioral Science for FNPPA Students (2-2-2-2) I-III-I-III. The Staff
Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients’ concerns and counseling health care in all areas including special concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

368A-368B-368C-368D. Family Practice and Community Health for FNPPA Students (2-2-2-2) II-II-II-I. Trolinger
Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Study of family dynamics, growth and development, and community health care in all areas including special concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

399. Special Study for Advanced Undergraduates (1-1) I, II, III, IV. Preceptor
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) II, II, Callahan
Lecture/discussion—18 hours total; clinical activity—6 hours total; conference or laboratory—4-8 hours total. 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 (Deferred grading only, pending completion of sequence.)

401. Preceptorship in Family Practice (1-9) III, III, IV. Morgan
Preceptorship—part-time (one 4-hour day per week, 20 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.

402. Introductory Medical Spanish (2) II, III. Mezel
Lecture/discussion—2 hours. Prerequisite: restricted to medical students in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination in Spanish. (SU grading only.)

407. Davis Community Clinic (2) II, III, IV. Tanji
Clinical activity—5-6 hours. Prerequisite: second-year medical student in good academic standing. Students learn to diagnose and treat medical problems as seen at a community clinic, under the direct supervision of a physician. (SU grading only.)

434A-434B-434C-434D-434E-434F. Primary Care at Clinica Tepali (3-3-3-3-3-3) II-II-II-I-II-II
Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions. Prerequisite: first-year medical students with consent of instructor; pre-application processed. Exposure to episodic and acute disease; learn physical examination and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only.)

435A-435B-435C-435D-435E-435F. Primary Care at Clinica Tepali (3-3-3-3-3-3) III-II-II-I-II-II
Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions. Prerequisite: third- and fourth-year (full-time) medical students with consent of instructor; pre-application processed. Counseling, diagnosis, and counseling of patients with chronic (long-term) and acute (short-term) disease under supervision of a physician. Exposure to other special health-care needs of ethnic groups, and poor people in general. (SU grading only.)

440. Ambulatory Medicine Clerkship (6 or 12) II, III, IV. Morgan, Nesbit
Clinical activity—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Ambulatory med-
cine experience in family practice setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by pri-
mary care physicians in the outpatient setting.

445. Sports Medicine from a Primary Care Per-
spective (8) II, III, IV. Tanji
Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic stand-
ing. Students spend full time in outpatient clinic set-
tings in family practice, orthopaedic surgery, physical education, internal medicine, and a community pre-
ceptorship. Students learn principles and practice of sports medicine from a primary care perspective.

452. Family Practice Preceptorship (3-18) II, III, IV. Morgan
Clinical activity—full time (3 days per unit). Prerequisite: consent of instructor. Preceptorship with primary care physicians in a variety of settings. Involvement in direct patient care and daily activities under supervision of preceptor.

453. Selected Readings in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—3-27 hours. Prerequisite: medical stu-
dents in good academic standing. Increase understand-
ing of family practice. Selection of readings and thorough discussion with faculty member.

468. Family Practice in a Foreign Culture (6-18) I, II, III, IV. Smilka
cClinical activity. Prerequisite: completion of third year in medical school. Visit a medical practitioner in a for-
gn country (arranged in advance by Department), accompany and participate in clinical activities of pre-
ceptor and analyze and report characteristics of the preceptor.

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 community pri-
mary care medicine 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 five hours per week spent in community physician preceptor who is a member of the clinical faculty. (SU grading only.)

498. Directed Group Study in Family Practice (1-9) I, II, III, IV. The Staff
Discussion—3-37 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics related to family medicine and primary health care delivery; visits to and written analysis of selected innovative health care programs. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instruc-
tor. Research in various aspects of the health care delivery system. (SU grading only.)

Human Physiology (HPH)

Upper Division Courses

192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Curry 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 (Curry in charge)
To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory expe-
rience on selected topics. (P/NP grading only.)

*Course not offered this academic year.*
199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Curry in charge)
Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/N grading only.)

Graduate Courses

200. Human Physiology (6) I, II, Curry, Rankin, 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 as laboratory/demonstration sessions, and examinations separate.

210. Advanced General Physiology (3) III. Curry, Cala
Lecture—3 hours. Prerequisite: Physiology 103B; Biochemistry 107B; graduate standing and consent of instructor. Physiological basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue levels. Offered in alternate years.

231. Renal Physiology (3) I. Rapinowitz
Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biological transport, fluid and electrolyte homeostasis, contraction and relaxation of smooth muscle, and pH physiology of the kidney in man. Offered in alternate years.

250. Circulatory Transport and Fluid Exchange (3) I. Rankin
Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112, 113 and 114, or courses 400, 403, or 418, or the equivalent; consent of instructor. Lectures, assigned reading and discussion of principles of microcirculatory exchange; blood, interstitial fluid, lymphatic circulation; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in alternate years.

280. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function (See 460). 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: structural 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.

299. Group Study (1-5) I, II, III, IV. The Staff (Curry 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 (Curry in charge)
Prerequisite: consent of instructor (S/U grading only.)

Professional Courses

400. Human Physiology (8) III. Curry, Rankin, and staff
Lecture—6 hours; laboratory—6 hours. Prerequisite: consent 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 430.)

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 and the cellular and systemic level. Principles that regulate homeostasis, especially in organ-interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

480. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 460.)

497T. Tutoring in Human Physiology (1-5) I, II, III, IV. Curry
Tutoring—3 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. Curry and staff
Discussion—2-6 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 student or 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/N grading only.)

98. Directed Group Study (1-2) I, II, III, IV. Last
Seminar—1-2 hours. Prerequisite: lower division standing. Directed group study in medicine and related fields. (P/N grading only.)

99. Undergraduate Research in Medicine: Molecular and Cell Biology (1-3) I, II, III, IV. Last
Prerequisite: consent of instructor. (P/N 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/N grading only.)

198. Internship (1-2) I, II, III, IV. Last
Seminar—1-2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-3) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: upper division standing; consent of instructor. (P/N grading only.)

Professional Courses

401A-401B-401C-401D. Physical Diagnosis Practicum B (1-2-2-2) I, II, III, IV. Bonekem
Fieldwork—2 hours; lecture—1 hour; laboratory/discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides 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. Jellett, Primny, Rucker and staff
Lecture—6 hours; lecture/discussion—1.5 hours; laboratory/discussion—0.5 hours (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A clinical 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 lecture and partly case-based disease state course. (Same course as Biological Chemistry 419.)

420A. Hematology (1) I. MacKenzie
Lecture—4 hours (for five weeks); laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic principles of the disease processes and the effect of disease processes on the human. 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 hemato logically.

420B. Gastrointestinal System (3.5) III. Zeldis
Lecture/discussion—36 hours (over a 4-week period). Prerequisite: consent 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 gastrointestinal and hepatic disorders, with discussion of common symptoms and signs presented to exemplify basic principles.

420C. Respiratory System (4) I. Lillington
Lecture—36 hours; discussion—10 hours (48 hours total). Prerequisite: consent 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: permission of 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 elliogy, mechanisms, diagnosis and management of the major diseases of the cardiovascular system, including ischemic, valvular, hypertensive, cardiac myopathies, pericardial, and electrical disorders. Lectures and small group discussions are employed.

420E. Nephrology (2.5) III. Kayen
Lecture—18 hours; discussion—12 hours; laboratory—2 hours (32 hours total over a 6.5-week period). Prerequisite—approval by Committee on Student Evaluation and Promotion. Fundamental knowledge 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. Fundamentals of (a) renal homeostatic processes in organs and tissues primarily involved in metabolic regulation and (b) general cellular and clinical and laboratory findings, diagnosis, and elementary management of patients with endocrinologic disorders can be rationalized.

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Schellin
Lecture—7.5 hours for three 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 and 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. (Same course as Community Health 421.)

440. Ambulatory Medicine Clerkship (3-12) I, II, III, IV. Fitzgerald Clinical activity—full time (2 to 6 weeks). Prerequisite: third-year medicine clerkship. Two- to eight-week ambulatory clerkship under direction of an internist and/or primary care clinic setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians. Several sites are available for rotation. 

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 patients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, conferences, and teaching sessions. 

462. Externship in Medicine (1-21) I, II, III, IV. Fitzgerald Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Role of acting intern and will be primary physician on medical ward; attendance of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. Also taken at Children’s S.F. Hospital. Limited enrollment.

463. Acting Internship in Medicine Intensive Care Unit (MICU) (4-12) I, II, III, IV. DeBrecht Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of Director of MICU. At UCD Medical Center, student functions as acting intern on MICU service. Under direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. On call in hospital every third night. Limited enrollment. 

465. Internal Medicine and Subspecialties in Outpatient Clinic: VA Outpatient Clinic (6-12) I, II, III, IV. White and staff Clinical activity—full time (4 or 12 weeks); includes conferences and lectures. Prerequisite: completion of third year of Medical School. Participation with members of specialty (internal medicine) and subspecialty (cardiology, gastroenterology, endocrinology, pulmonary and immunology-allergy) in the initial clinical evaluation, work-up, management and follow-up of patients in outpatient clinical setting. Limited enrollment.

498. Group Study in Internal Medicine (1-18) I, II, III, IV. The Staff (Silva in charge) Prerequisite: consent of instructor. Special study for medical students who may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCD Medical Center or off campus by specific arrangement. (SU grading only.)

Internal Medicine—Cardiology (CAR)

Upper Division Course

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.)

Graduate Course

220. Basic Science in Cardiology (1) III. Kaufman Lecture—1 hour. Prerequisite: graduate or medical student status; general understanding of cardiovascular system. 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. (SU 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: Medical Sciences 431, 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 (2 or 4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Research and laboratories 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.

466. 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. (SU grading only.)

480. 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. (SU grading only.) Limited enrollment.

496. Research (1-12) I, II, III, IV. The Staff Prerequisite: approval by Division of Cardiology. (SU grading only.)

Internal Medicine—Clinical Nutrition and Metabolism (NPM)

Upper Division Course

192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted, Phalen, 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

280C. Clinical Nutrition Research Conference (1) I, II, III, IV. Halsted, Phalen, 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 the field of clinical nutrition. (SU grading only.)

Professional Courses

461. Nutrition Clinical Clerkship (3-18) I, II, III, IV. Halsted, Phalen, and staff Lecture—2 hours; clinical activity—full time (2 to 12 weeks). In-depth experience in asessment 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.

468. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted, Phalen, and staff Clinical activity—3-9 hours. Prerequisite: student in good standing; consent of instructor. Will attend weekly clinical nutrition consult rounds (four evenings) and Nutrition Clinic (one day). Introduction to diagnosis and treatment of common nutritional problems. (SU grading only.)

499. Research in Nutrition (9-18) I, II, III, IV. Halsted, Phalen, Davis Seminar—1 hour. 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)

Upper Division Course

192. Internship in Emergency Medicine (1-12) I, II, III, IV. Deretl 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.)

Professional Courses

401. Preceptorship in Emergency Medicine (1-6) I, II, III, IV. Mitchell Conference—2 hours; clinical activity—4-10 hours; term, paper, discussion—2-10 hours. Prerequisite: Family Practice 400A, 400B, 400C or consent of instructor based upon previous equivalent experience. A broad range of emergency medical problems are managed. Different styles will be demonstrated. Participation in history taking and physical examination, based upon student experience. Submission of a literature review of an Emergency Medicine topic is required. (SU grading only.)

460. Emergency Medicine Clerkship (6) I, II, III, IV. Mitchell and staff Clinical activity—full time (4 weeks). Prerequisite: third or fourth year medical student; satisfactory completion of Internal Medicine or Surgery clerkship; consent of instructor. Clinical work at UCD Medical Center or other area hospitals’ emergency departments will be supplemented by didactic sessions. Students will be assigned appropriate emergency patients and will examine diseases and treat those patients.

465. Actting Internship in Emergency Medicine (3-12) I, II, III, IV. Mitchell Lecture/discussion—4 hours; independent study—4 hours; clinical activity—40 hours; hospital rounds—full time (4 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.
Internal Medicine—Endocrinology and Metabolism (ENM)

Upper Division Course
192. Internship in Endocrinology (1-12) I, II, III, IV.
Walter and staff
Internship—9-36 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
295. Research (1-12) I, II, III, IV. The Staff (Walter in charge)
Prerequisite: consent of instructor. Endocrinology research. (SU grading only.)

Professional Courses
460. Endocrinology Clinical Clerkship (5-18) I, II, III, IV. Walter and staff
Clinical activity (inpatient-outpatient service)—full time (3 days per week). Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, and management of follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

460. Insights in Endocrinology (1-3) I, II, III, IV. Walter
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. The staff also give brief endocrine and oral presentation to the endocrine group. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Walter in charge)
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Gastroenterology (GAS)

Upper Division Course
192. Internship in Gastroenterology (1-12) I, II, III, IV. Trude and staff
Internship—9-36 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.)

Professional Courses
460. Clinical Clerkship (3-18) I, II, III, IV. Trude 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 consult service. Gastroenterology patients. Daily rounds with attending physician.

480. Insights in Gastroenterology (1-3) I, II, III, IV. Trude
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 procedure, ward rounds, outpatient clinic, and GI grand rounds. (SU grading only.)

499. Research (1-12) I, II, III, IV. Pimstone, Trudeu, Prichard, Zaidi
Clinical activity: varied. Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Some will involve both inpatient care and research laboratory personnel. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. (SU 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. Introduction to AIDS and Related Disorders (2 I, II, III, IV. Pimstone, staff
Clinical activity—30 hours; discussion—10 hours. Prerequisite: first and second year medical students in good academic standing and permission of instructor. This course 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 clinical research as well as examine alternative life styles. May be repeated for credit. (SU grading only.)

460. General Medicine Consults (1-19) 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 general internists. 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.

471. Clinical Care of the HIV-Infected Patient (6-3) I, II, III, IV. Lawrence and staff
Clinical activity—full time (4-6 weeks). Prerequisite: successful completion of Medical Sciences 431. Participation in evaluation and management of HIV-infected individuals at all stages of their disease in both inpatient and outpatient settings. Includes consultations, attendance at HIV and infectious disease clinics and multidisciplinary conferences.

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. Students will observe work-up, diagnostic evaluation and management of common general internal medicine problems in ambulatory and inpatient settings; be supervised by attending physicians while attending General Medicine Clinic and/or Consult Rounds; and make brief presentations to consult service. (SU 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. The student will be involved in a clinical research problem within the areas of 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.

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

*Course not offered this academic year.

Medicine, School of 305

Professional Courses
480. Hematology—Oncology Clinical Clerkship (6-18) I, II, III, IV. Meyers and staff
Clinical activity (inpatient-outpatient service)—full time (4-12 weeks). Prerequisite: Medical Sciences 431 and/or consent of instructor. Acting internship in inpatient Hematology—Oncology Service. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

481. Ambulatory and Consult Clerkship (6-12) I, II, III, IV. Meyers and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematologic oncology clinics, hemophilia clinic, sickle cell clinic, and two medical/surgical joint clinics. In addition, students will work on inpatient hematologic oncology service, bone marrow transplants, and will attend all conferences sponsored by the Division.

482. Hematology—Oncology Clinical Clerkship (6-18) I, II, III, IV. Gandara, Perez
Clinical activity (inpatient-outpatient service)—full time (4-12 weeks). Prerequisite: Medical Sciences 431 and/or consent of instructor. Clinical experience in hematology-oncology at the Sacramento VA Clinic with emphasis on evaluating new patients with anemia, coagulation disorders, reading bone marrows, and administering chemotherapy. Weekly tutorial sessions with faculty and attendance at division conference. May be repeated for credit. Limited enrollment.

Clinical activity—40 hours/week for 4 weeks. Prerequisite: fourth-year medical student and an interview with program Medical Director. Work with hospice team to gain experience in symptom relief, psychosocial counseling and bereavement counseling. A written report will be a major component used in grading. This course fulfills the Ambulatory Care requirement.

499. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Infectious Diseases (IDI)

Upper Division Courses
192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Jordan 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 (Jordan 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) I, II, III, IV. Dandel
discussion—3 hours. Prerequisite: graduate standing. Presentation of molecular pathobiology of human and animal viruses. Emphasize on molecular diagnostics
at cellular/tissue level, and therapy including vaccines and gene transfer using recombinant DNA technology.

299. Research in Infectious Diseases (1-12) I, II, III, IV. The Staff (Jordan in charge)
Prerequisite: consent of instructor. Laboratory investigation contributing to dissertation for a graduate degree. (SU grading only.)

Professional Courses
400. Infectious Diseases Clinic (4.5-6) I, II, III, IV. Jordan and staff
Clinical activity—full time (3 to 4 weeks). Ambulatory patient care training. Prerequisite: Medical Sciences 431. Selected outpatients at UC Davis Medical Center with chronic respiratory or urinary tract infections will be worked up and followed.

460. Infectious Diseases Clinical Clerkship (6-18) I, II, III, IV. Jordan
Clinical activity—full time (4-12 weeks). Prerequisite: successful completion of two years of study in an accredited medical school. In addition to seeing patients ill with infectious diseases regarding whom consultation has been requested, students will have laboratory experience in clinical microbiology. Students will also attend and participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.

480. Insights in Infectious Diseases (1-3) I, II, III, IV. Jordan
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Students will attend infectious disease consult rounds and also have opportunity to observe outpatient infectious disease practice and clinically related research. Introduction to diagnosis and treatment of patients in Infectious Diseases. (SU grading only.)

490. Seminar in Infectious and Immunologic Diseases (2) I, II, III, IV. Jordan and staff
Seminar—2 hours; library research. Prerequisite: Medical Sciences 431. Epidemiology, diagnosis and management of the more important infectious and immunologic diseases will be considered. Wherever possible, actual inpatients (UCD Medical Center) will be used to demonstrate evaluation of individual cases. (SU grading only.) Limited enrollment. (May enroll for two consecutive quarters.)

499. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Jordan 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. (SU grading only.)

Internal Medicine—Nephrology (NEP)

Upper Division Course
192. Internship in Nephrology (1-12) I, II, III, IV. Kayser 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. Kayser 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, including 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. Kayser
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. (SU grading only.)

Internal Medicine—Occupational and Environmental Health (OEH)

Upper Division Courses
190C. Research Conference in Occupational and Environmental Health (1) I. Beaumont; II. Samuels; III. McCurdy; IV. DuShane
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussion of recent articles in the literature. May be repeated for credit. (P/NP grading only.)

192. Internship in Occupational and Environmental Health (1-12) I, II, III, IV. Schenker and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in occupational and environmental health. May be repeated for credit up to 12 units. (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. Pesticide Epidemiology (3) I, II, III. The Staff
Discussion—1 hour. Prerequisite: medical students; graduate students in biological or environmental health sciences who have completed or are enrolled in Epidemiology and Preventive Medicine 435; upper division undergraduate who has completed Environmental Studies 126; consent of instructor. Examination of the human health effects and the risk of disease from occupational and environmental exposure to the pesticides. (TU grading only.)

255. Environmental Health Risk Assessment (3) III. Goldsmith, Becker
Seminar—1.5 hours; lecture/discussion—1.5 hours. Prerequisite: course 250 or 251 or consent of instructor. The components of risk assessment include: hazard identification, dose-response, exposure assessment and risk characterization, extrapolation of toxicology, pharmacology, epidemiologic studies, risk management, comparison of cancer and noncancer endpoints, and risk communication strategies for regulatory policy-making.

Professional Courses
460. Occupational and Environmental Medicine Elective (6-12) I, II, III, IV. Schenker
Clinical and laboratory experience—full time (4 to 6 weeks). Prerequisite: fourth-year student and consent of instructor. Participation in activities of Occupational and Environmental Medicine 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. (SU grading only.)

480. Insights in Occupational and Environmental Medicine (1-3) I, II, III, IV. Schenker
Clinical activity—3-9 hours; small research projects. Prerequisite: first- or second-year medical student in good 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 electives and field visits. Students develop and present small individual research projects. (SU grading only.)

499. Research (1-12) I, II, III, IV. Schenker and staff
Laboratory—40 hours; clinical activity—4 or 8 hours. Prerequisite: third- or fourth-year medical student with consent of instructor. Participant in Division of Occupational and Environmental Health Major activity is involvement in an epidemiologic research project of the Division. Also participates in ambulatory Occupational and Environmental Medicine Clinic at UC Davis Medical Center.

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 Course
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.

Professional Courses
460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary 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. Bonnet
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, work-up, 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. Students 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. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Rheumatology-Allergy (RAL)

Lower Division Course
99. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory—4 hours. 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—1.5 hours. 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) I. Gershwin, Robbins
Lecture—4 hours. Prerequisite: Medical Microbiology
107 or Veterinary Microbiology 270, or consent of instructor. Prerequisite: comparative 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.

258. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin Laboratory—1–5 hours. Prerequisite: consent of instructor. Library and/ or laboratory work as required. (SU grading only.)

259. Research in Autoimmune Disease (1-12) I, II, III, IV. Gershwin Laboratory—1–12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenital, autoimmunity, atopic dermatitis, aspergillus, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjögren’s syndrome, polymyositis and drug hypersensitivity. (SU 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. Gershwin 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. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Gershwin in charge) Prerequisite: medical student with consent of instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. (SU grading only.)

Medical Microbiology (MMI)

Upper Division Courses

107. Chemical and Cellular Immunology (4) II. Sci-bienski Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B 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; immunogenetics and regulation of the immune response. (Same course as 407.)

115. Ecological Parasitology (3) II. Theis Lecture—3 hours. Study of mankind’s influence on environment, including climate, behavior and geography that affect the development and spread of parasitic agents.

116. Parasitology for Wildlife Biologists (2) II. Theis Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role diseases and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the pathology, ecology and zoonotic potential of parasites encountered by wildlife biologists.

130. Medical Mycology (2) II. Pappagianis Lecture—4 hours. Prerequisite: consent of instructor. Development and classification of fungi. Pathogenic fungi: their life cycles, morphology, and pathogenesis. (Same course as 450.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beanam in charge) Internship—3–36 hours; final report. Prerequisite: upon approval of instructor. 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 (Beanam in charge) Course—4 hours. Prerequisite: upon approval of instructor. Directed reading and discussion on selected topics. (P/NP grading only.)

199. Research in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beanam in charge) Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

200. Mechanisms for Microbial Interactions with Hosts (3) III. Beanam 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. (SU grading only.) (Same course as 403.)

215. Medical Parasitology (5) I. Theis Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiological, pathological, 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. Beanam Lecture—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 readings and formal student presentations of assigned topics.

298. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beanam in charge) Prerequisite: consent of instructor. Directed reading and discussion on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beanam in charge) Prerequisite: medical students with consent of instructor. Individual research. (SU 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 or the equivalent, or consent of instructor. Survey of principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug dependency and related topics. Offered in alternate years.

*Course not offered this academic year.

415. Medical Parasitology (5) I. Theis Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Approved for graduate credit. Epidemiological, pathological, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (SU grading only.) (Same course as 215.)

420. Current Concepts in Bacterial Ultrastructure (2) II. Beanam 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. (SU grading only.)

430. Medical Mycology (2) II. Pappagianis Lecture—2 hours. Prerequisite: a course in pathogenic microbiology; 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.)

460A. Medical Immunology (2.5) III. Sci-bienski 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.

460B. Pathogenic Microbiology (6.5) I. Sci-bienski Lecture—7 hours (four weeks only). 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. Beanam and staff Tutoring—3–15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assistant instructor by students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beanam in charge) Prerequisite: medical students with consent of instructor. Directed reading and discussion on selected topics. (SU grading only.)

99. Research (1-12) I, II, III, IV. The Staff (Beanam in charge) Prerequisite: medical students with consent of instructor. (SU grading only.)
192. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge) Internship—36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in pharmaceutical enterprises. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N 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 mammalian pharmacology designed for graduate and medical students. Topics in brain function, including pharmacokinetics and drug metabolism and the actions, use and toxicity of 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 mammalian pharmacology designed for graduate and medical students. The actions, use and toxicity of major classes of drugs. Continuation of course 200A.

201. Pharmacology of the Nervous System: Transmitter Substances (2) I. Hance Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in alternate years.

202. Pharmacology of the Nervous System: Hypnotics, Sedatives and Anesthetics (3) II. The Staff (Chairperson in charge) Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in alternate years.

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 anticonvulsant 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.


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.

208. Application of Computers to Pharmacology (1) II, III, IV. The Staff Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

220. Statistical Approach to Pharmacological Research (2) III. The Staff Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to statistical methods of pharmacological research, and application of standard statistical methods to data analysis. (P/N grading only.)

297. Tutoring in Pharmacology (1-3) I, II, III. The Staff (Chairperson in charge) Tutor—3 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 of pharmacology, including drug action, 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: consent of 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 (Chairperson in charge) 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 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/N grading only.)

Graduate Courses

201. Human Behavioral Neurobiology (2) I. Jagust, Robertson Lecture—discussion—2 hours. Prerequisite: Cell Biology and Human Anatomy 203, Psychology 108 or 136, Neuropsychology and Behavioral Neuroscience 209, or consent of instructor. Emphasis on understanding the functional and anatomical basis of behavior and cognitive processes in humans. (P/N grading only.)

202. Visual and Neurobiology (2) I, II. Refai Seminar—2 hours. Prerequisite: course 201, Cell Biology and Human Anatomy 203. Overview of neural mechanisms of visual behavior in humans will examine the integration of visual and attentional systems. Performance and neurophysiology of visual systems and visual deficits in humans and neuropsychological patients in clinical situations will be considered. Offered in alternate years.

203. Seminar in Selected Topics (1-5) I, II, III, IV. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (S/U grading only.)

208. Group Study (1-5) I, II, III, IV. The Staff (Chairperson 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.)

209. Individual Special Study and Research (1-12) I, II, III, IV. The Staff (Chairperson in charge) Laboratory—36 hours. Prerequisite: consent of instructor. Individual special study and research in neurophysiology and biomedical engineering is offered at both Davis and Sacramento Medical Centers. (S/U grading only.)

Professional Courses

410. Clinical Neurosciences (4) I, II, III, IV. Remler and staff Lecture—8 hours; laboratory—discussion—5 hours (for five weeks total). Prerequisite: medical student with consent of 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 injury, neoplasia and trauma will be discussed.


454. Electroencephalography and Evoked Potentials (18) I, II, III, IV. Richman and staff Clinical activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electrophysiological 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). Prerequisites: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Student exposed to children with neurological 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. Course satisfies the fourth year neuro-

456. Cortical Neurology (3-18) I, II, III, IV. Ferrer, Knight
Clinical neurological research—full time (12 weeks at Highland Hospital, Oakland). Prerequisite: course 451 or the equivalent; consent of instructor. Student will pursue a 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). Prerequisites: course 450, 451 or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise in interest in elective field. Students may elect tutorial reading or research in topics of their interest. Offered in the Martinez VA Medical Center. (SU grading only.)

458. Introduction to Cognitive and Communication Disorders (3) I. Droneker
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, treatment. Offered in the Martinez VA Medical Center. (SU grading only.)

459. Independent Study in Neuromuscular Communication Disorders (1-3) I, II, III, IV. Dockers
Conference, observation and data collection—3 hours. Prerequisite: consent of instructor. Independent study of neuromuscular communication disorders—aphasia, dementia, apraxia of speech, dysarthria. Designed for individual interest and includes discussion, discussion, research design, data collection, and preparation of results. Offered in the Martinez VA Medical Center. (SU grading only.)

460. Clinical Neurology (3-18) IV, I, II, III. The Staff
Clinical activity—full time (minimum of one-half quarte-
Prerequisite: fourth-year medical student or third-
year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neu-

461. Special Clinical Elective in Neurology (6-18) I, II, III, IV. The Staff
Clinical activity—full time (4 to 12 weeks). Prerequisites: fourth-year medical student or third-year medical student with clerkship in medicine and Pediatrics. Emphasis will be on mastering the neurologic examination and General Neurology. Course to neurologic evaluation, diagnosis and therapy.

462. 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. (SU grading only.)

463. Research (1-12) I, II, III, IV. The Staff (Riehman in charge)
Laboratory—2 to 24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. (SU 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

259. Neurosurgical Research (3-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate student with consent of instruc-
Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (SU grading only.)

Professional Courses

451. Neurosurgical Critical Care (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 instruc-
Student participates in the care of neurosurgical patients in the ICU and in the admission and surgical management of patients admitted through the Emergency Room.

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). Prerequisites: 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 selected conferences, rounds, seminars.

464. Elective Surgery (6-18) I, II, III, IV. The Staff
Clinical activity—full time (3 days per unit). Prerequisites: third- and fourth-year medical student; Medical Sciences 432A or the equivalent; consent of instruc-
tor. Active participation in inpatient and outpatient care. Attendance at selected conferences; student—faculty member informal conferences. May be repeated for credit.

470. Clinical Neurosurgery (6-18) I, II, III, IV. The Staff
Clinical activity—full time (4 weeks). Prerequisite:
third- and fourth-year medical student who has completed Medical Sciences 432A or the equivalent; 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 weeks). Prerequisites: third- and fourth-year medical students who have completed Medical Sciences 432A; 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 be able to discuss treatment regimens. Night call in Labor and Delivery. Every third night.

489. Research in Obstetrics and Gynecology (4-18) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instruc-
tor. Student will pursue a research problem of her/his own choosing, selected in consultation with the faculty. Internship with ongoing faculty research projects recom-
med. (SU grading only.)

Ophthalmology (OPT)

Upper Division Courses

192. Research Internship (1-12) I, II, III, IV. The Staff
Internship—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of intern-
ship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthal-
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. (SU grading only.)

291. Seminar in Early Mammalian Development (1) I, II, III, IV. Wiley
Seminar—1 hour. Each student will be asked to pre-

309. Medicine, School of
ology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P.N.P. grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P.N.P. grading only.)

Graduate Course
298. 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, 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 (3 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.

485. Advanced Subspeciality Ophthalmology (6 or 9) I, II, III, IV. M. Miller, J. Brandt
Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (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-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 to 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
95. Special Studies for Undergraduates (1-4) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: lower division standing and consent of instructor. (P.N.P. grading only.)

Upper Division Course
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.N.P. grading only.)

Professional Courses
421. The Musculoskeletal System (2.5)
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. Matthews
Clinical activity—full time (2-4 weeks). Prerequisite: third- or fourth-year medical student in good standing and consent of instructor. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment. Emphasis on orthopaedic physical examination and interpretation of x-rays. Does not meet surgical specialty requirement. Limited enrollment.

428. Ambulatory Orthopaedics (3-6) I, II, III, IV. Rodrigue
Clinical activity—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and consent of instructor. Introduction to general orthopaedic problems and their management in an outpatient environment. Students will conduct orthopaedic examinations, present patients to staff, and lead discussion of treatment regimens. Emphasis placed on orthopaedic physical examination and interpretation of x-rays. Does not meet surgical specialty requirement. Limited enrollment.

428. Community Preceptorship (3-6) I, II, III, IV. Matthews
Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and consent of instructor. Designed to acquaint student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room and inpatient environment. Preceptorships available in Sacramento and surrounding areas. Student must provide own transportation.

464. Acting Internship (6) I, II, III, IV. Matthews
Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year 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.

480. Insights in Orthopaedic Surgery (1-3) I, II, III, IV. Szabo
Clinical activity—3 to 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 (1-3) I. Benson
Lecture/discussion—2.5 hours at first week. Prerequisite: third- or fourth-year students in School of Medicine or second-year students with permission of Instructor of Record. 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. Orthopaedic Research (1-12) I, II, III, IV. The Staff (Rodrigue in charge)
Clinical activity—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. (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 project-instructor. Great emphasis on clinical work in otolaryngology and related fields. Final project report. (P.N.P. grading only.)

188. Directed Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P.N.P. 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.N.P. grading only.)

Graduate Courses
290C. Research Conference in Otolaryngology (1) I, II, III. 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) I. 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. Chole 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. Chole
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. Lecuter—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) I. 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 tissue.

404. Otolaryngology Required Clerkship (3) I, II, III, IV. Brodie
Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides fundamental knowledge of otolaryngologic diagnosis and principles, develops facility with basic ENT instruments, provides an understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otolaryngologic care.

Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students; approved for graduate degree credit. Involvement in clinical activities of the department.

480. Insights in Otolaryngology (1-3) I, II, III, IV. Brodie
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. (SU grading only.)

*490. Journal Seminar (1 I, II, III, IV. Donah. Coles) 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 otolaryngology and related literature and recent advances.

498. Individual or Group Study (1-5) I, II, III, IV. The Staff Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussions and laboratory study of sensory and motor systems. (SU 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. (SU grading only.)

Pathology (PMD)

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff Internship—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience pertinent to pathology and related fields. (P/INP 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/INP grading only.)

Graduate Courses

202. Current Topics in Tumor Biology (2) I, II, III, IV. Cardiff Seminar—2 hours. Prerequisite: consent of instructor. Discussion of current topics in tumor biology by invited speakers and members of the class. A forum for presentation of proposed and completed experiments by persons interested in tumor biology. (SU grading only.)

207. Introduction to Nervous System Pathology (4-1) I, II, III, IV. Ellis Lecture—1-4 hours; preclinical seminar. Prerequisite: consent of instructor; open to advanced undergraduate, graduate, veterinary medical and dental students. Study of nervous system tissue responses to injury, infection, neoplasia, and malformation in both the human and experimental animal. Seminars include correlation of clinical, gross and microscopic findings. Discussions provide instruction in microscopic techniques. (SU grading only.)

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 concepts of disease processes. Stresses mastery of pathophysiologic 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 410 A.) Course not intended for veterinary medical or medical students.

208. 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. (SU grading only.)

Professional Courses

404. Forensic Pathology (2) III. William Laboratory—60 hours total. 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. (SU grading only.)

*405. Brain-Cutting Conference (1-4) I, II, III, IV. Ellis Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed.

*407. Diseases of the Nervous System (1-3) I, II, III, IV. Ellis Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: third- and fourth-year medical students or special training in pathology or neurological sciences; consent of instructor. Study of human nervous system; reactions to diseases including infection, neoplasia and maldevelopment; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases. Discussions include individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

*408. Anatomic Pathology Case Studies (1-12) I, II, III, IV. Rubner Discussion—1-4 hours, laboratory—3-24 hours. Prerequisite: medical student or consent of instructor. Participation and/or performance, under supervision, of complete autopsies and surgical pathology, with correlative discussion of clinical material, gross, microscopic and laboratory findings.

410A-410B. General/Systemic Pathology (4.5, 7.5) III-IV. Cardiff Lecture—30, 30 hours total; laboratory/discussion—25, 90 hours total; tutorial—0, 5 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. In-depth study of disease and its causes related to the general mechanisms of disease and each of the specific human organ systems. Concepts of pathophysiology applicable and required for clinical diagnosis. (Deferred grading only, pending completion of sequence.)

464. Clerkship in Advanced Surgical Pathology (6-12) I, II, III, IV. The Staff Clinical activity—full time (4-8 weeks). Prerequisite: third- or fourth-year medical student or consent of instructor. Designed to provide students with an intensive experience in surgical pathology. Participation in grossing of specimens, preparation of frozen sections and slide reading sessions. Students attend surgical pathology conferences and seminar sessions in which clinical correlation and diagnostic information is discussed.

465. Applied Clinical Laboratory Medicine (6) 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 Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor in tutoring, preclinical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Advanced Group Study (1-5) I, II, III, IV. The Staff Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (SU grading only.)

499. Research (1-18) I, II, III, IV. The Staff Prerequisite: medical student with consent of instructor. Research in experimental, molecular, comparative, and applied pathology. Limited enrollment. (SU grading only.)

*Course not offered this academic year.

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/INP 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. (SU grading only.)

Professional Courses

401. Preceptorship in Pediatrics (2) I, II, III, IV. Chairperson in charge Preceptorship—full 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 (4 to 12 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 432B; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor performing such tasks as history taking, physical examination, and patient management.

420. Reproductive System/Perinatology (2) IV. Oi Lecture—3.5 hours (for 6 weeks). Introduction to clinical obstetrics and gynecology and perinatology as an extension of material introduced in the sciences basic to medicine in anatomy, reproductive physiology, and molecular biogenetics. (Same course as Obstetrics and Gynecology 420.)

460A. Acting Internship: General Inpatient Pediatric Clerkship (6-18) I, II, III, IV. Halsted Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B 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 (6-18) I, II, III, IV. McCann Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better, letter of recommendation from Pediatrics faculty member. Supervised experience in pediatric care on outpatient service at UCD Medical Center. Student functions as "Acting Intern" with appropriate supervision by residents and attending faculty. Limited enrollment.

461. Elective in Pediatric Hematology/Oncology (3-18) I, II, III, IV. Ducroq Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; 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. Conors 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: satisfactory completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatri
cas faculty member. Diagnostic and therapeutic aspects of the medical and surgical high-risk neonate. Students expected to take night call every third night during rotation. Limited enrollment.

465. Pediatric Specialty Clinic Elective (3-18) I, II, III, IV. McCann and staff
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B; 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. Pariser
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B. Inpatient and outpatient experience in diagnosis and management of congenital and acquired heart diseases. Limited enrollment.

467. Elective in Pulmonary Medicine (3-18) I, II, III, IV. McDonald, Joa
Clinical activity—full time (2 to 12 weeks). Daily round on two weekly half-day clinics. Prerequisite: pulmonary clerkship. Inpatient and outpatient management of patients with respiratory diseases. Students will be expected to participate in daily rounds and clinical conferences. Limited enrollment.

468. Elective in Pediatric Nephrology (3-18) I, II, III, IV. Bokan
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal diseases in children. Laboratory experience and participation in clinical investigations may be arranged. Limited enrollment.

469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV. Huizenga
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious diseases of infants and children. Limited enrollment.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Gospe
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological diseases 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. Cannon
Clinical activity—full time (2 to 12 weeks). Prerequi
tive: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastrointestinal diseases in children. Limited enrollment.

472. Acting Internship in Pediatric Intensive Care (6-18) I, II, III, IV. Sheik
Clinical activity—full time (4 to 12 weeks). Prerequi
tive: completion of Medical Sciences 432B with grade of A or consent of instructor of record; letter of recom
dmodation 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 (Syracuse charge)
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hemato
tology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by the student will be emphasized and long-term projects are possible. (SU grading only.)

Plastic Surgery (PSU)

Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical stu
dents; Medical Sciences 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. Microsurgical and endoscopic techniques. Limited enrollment.

451. Dentistry for Future Physicians and Surge
s (6-8) I, II, III, IV. Thaler
Discussion-seminar—3 hours; laboratory—2 hours; clinic activity—full time (4-6 weeks). Prerequisite: The service takes place under the supervision of the Department of Plastic Surgery, and all students must be enrolled in the department. Students will be evaluated based on their participation in the course. (SU grading only.)

452. Psychiatry (PSY)

453. Clinical Psychology Elective (1-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (SU grading only.)

Professional Courses

450. Clinical Psychiatric Medicine (3-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of psychiatric disorders in children and adolescents. Limited enrollment.

451. Clinical Psychiatry Elective (1-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (SU grading only.)

Graduate Courses

201A. Sports Medicine: Medical Aspects of Sports Injuries (5) I. Bernsner
Lecture—2 hours; laboratory—1 hour. Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in the diagnosis and management of sports injuries. Limited enrollment.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

440. Rehabilitation Medicine Fellowship (3, 6-18) I, II, III, IV. McDonald
Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in the diagnosis and management of neurological, orthopedic, and musculoskeletal disorders. Limited enrollment.

441. Rehabilitation Medicine Fellowship (1-18) I, II, III, IV. S. C. Kerber
Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in the diagnosis and management of neurological, orthopedic, and musculoskeletal disorders. Limited enrollment.

461. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kimer
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430, 431. Limited to fourth-year medical students. Students will work in a neurology clinic. Limited enrollment.

462. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kimer
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430, 431. Limited to fourth-year medical students. Students will work in a neurology clinic. Limited enrollment.

498. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience in medical schools in any of a number of areas of physical medicine and rehabilitation. (SU 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. (SU grading only.)

*Course not offered this academic year.
412. Psychiatry Grand Rounds (1) II, III, IV. Carter and staff
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCD Medical Center for presentation of selected cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Carter and staff
Clinical activity—full-time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (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. Carter and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Students function as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychotherapy residents.

416. Child Psychiatry Clerkship (6-12) I, II, III, IV. Carter and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical management of children, adolescents, and families. Clinical observations, diagnostic assessment, and therapy 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. Carter and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of course coordinator. Students gain experience in an unusual setting, including staff, patient care, and community outreach.

418. Off-Campus Clinical Experience (6-12) I, II, III, IV. Carter and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Students function as medical students, gain experience in off-campus medical school or mental health setting. To be arranged with advanced approval of instructor and individual off-campus setting.

420. Acting Internship in Psychiatry (6-12) I, II, III, IV. Carter and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of course coordinator. Students function as medical student and observe psychiatrists in practice. Students function as junior residents.

422. Readings in Psychiatry (1-3) I, II, III, IV. Carter and staff
Readings-discussion—3 to 8 hours. Independent reading of selected topics in psychiatry. Supervision and discussion with a psychiatry clerkship member. (SU grading only.)

480. Insights in Psychiatry (1-3) I, II, III, IV. Carter and staff
Clinical activity—4 to 9 hours. Prerequisite: first- or second-year medical student. Seminar in psychiatric academic affairs; consent of instructor. On a regular basis, students are provided with an opportunity for gaining insights into various clinical activities in the practice of psychiatry. (SU grading only.)

489. Directed Group Study (1-6) I, II, III, IV. Blacker and Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (SU grading only for graduate or medical students.)

499. Research (1-12) I, II, III, IV. Carter and staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (SU grading only for graduate or medical students.)

Radiation Oncology (RON)

Graduate Course
299. Independent Study and Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: enrollment with Biophysics Group for Ph.D. candidacy, and consent of group adviser and sponsor. (SU grading only.)

Professional Courses
Clinical activity—full time (3 to 6 weeks). Prerequisite: completion of Medical Sciences 430, 431; second-year clinical clerkship in medical oncology and consent of instructor required. Introduction to radiation oncology. Students will participate in treatment and planning and radiation oncology patients and will be introduced to the protocols involved in this field. 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. (SU grading only for medical students.)

Radiotherapy—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 chemistry and radiochemistry into a comprehensive and rigorous lecture-laboratory exposure in biomedical radiochemistry. Subjects include chemistry of radiopharmaceutical compounds and imaging agents, basic principles of radiochemistry, and nuclear medicine imaging. (Same course as 301.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (S. DeNardo in charge)
Prerequisite: upper division standing and consent of instructor. (PNP grading only.)

199. Special Study for Advanced Undergraduates (1-6) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: upper division standing and consent of instructor. (PNP grading only.)

Graduate Course
299. Research: Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses
401. Biomedical Radiochemistry (3) III. The Staff
Lecture—4 to 6 hours; laboratory—12 hours. Prerequisite: consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and rigorous lecture-laboratory exposure in biomedical radiochemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radiommona. (Same course as 309.)

411. Radiological Physics I (Physics of Nuclear Medicine) (3) I. Bushberg, Vera
Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radiology of the eye, nuclear medicine, internal dosimetry, external dosimetry, radiation detection and imaging, and computerized imaging. (SU grading only.)

463. Clinical Clerkship in Nuclear Medicine (3 or 12) I, II, III, IV. Stadland
Clinical activity—full time (3 days per week). Prerequisite: satisfactory completion of first year of Medical School or the equivalent; consent of instructor. Clerkship correlates radiotopic 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 applying 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. (SU 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. (SU 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. (PnP grading only.)

193. Special Study in General Surgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (PnP grading only.)

Graduate Course

295. Research (1-12) I, II, III, IV. Wolfe in charge Prerequire: graduate standing and consent of instructor. (Su 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.

460. Clinical Surgical Elective (6-18) I, II, III, IV. Berfield
Clinical activity—full time. Prerequisites: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Rotation through Surgery Specialty clinics: vascular, GI, GU, thoracic, plastic, radiotheray. Student works up one new, two return patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussion.

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 student with completion of Medical Sciences 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. Blasdell and staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 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 Medical Sciences 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 Medical Sciences 430. Student participates with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical, general, and specific cases. Participate in their care.

466. General Surgery Clerkship: Kaiser 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 Medical Sciences 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.

Urology (URO)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-6) I, II, III, IV. deVere White
Prerequisite: consent of instructor. (PnP 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 diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized.

460. Urology Clinical Clerkship (5-18) I, II, III, IV. 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. Extremity 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 patient 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, flowmetry, recombinant DNA) in research, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthescs.

Medicine

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department
Department Office: 2102 Medical Science 1A (916-752-1363)

Faculty
Alexander A. Arcars, D.V.M., M.S., Professor
Dale L. Brooks, D.V.M., Ph.D., Lecturer
Gary P. Carlson, D.V.M., Ph.D., Professor
Larry D. Cowgill, D.V.M., Ph.D., Associate Professor
Nancy E. East, M.S., M.P.V.M., Associate Professor
Pamela H. Eisiele, D.V.M., Assistant Clinical Professor
Lawrence P. Enois, Pharm.D., Lecturer
Lisa W. George, D.V.M., Ph.D., Associate Professor
Ronald P. Hedrick, Ph.D., Associate Professor
David E. Hinton, Ph.D., Professor
Charles A. Hjeros, D.V.M., Professor
Peter J. Irke, V.M.D., Professor
Mark D. Kittleman, D.V.M., M.S., Ph.D., Professor
Gerald V. Ling, D.V.M., Professor
John P. Maas, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Medicine (California Veterinary Diagnostic Laboratory)
John Macdigan, M.S., D.V.M., Associate Professor
Richard W. Nelson, D.V.M., Associate Professor
Nels C. Pedersen, D.V.M., Ph.D., Professor
Jeffrey A. Roberts, D.V.M., Assistant Clinical Professor
Bradford P. Smith, D.V.M., Professor
Sharon J. Spier, D.V.M., Ph.D., Assistant Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor (Medicine, Pathology)
William P. Thomas, D.V.M., Associate Professor
Michael Torten, D.V.M., Ph.D., Research Virologist
Leon D. Weaver, V.M.D., Senior Lecturer
James F. Wilson, D.V.M., J.D., Lecturer
W. David Wilson, D.V.M., B.S., M.R.C.V.S., Associate Professor
William W. Wingfield, M.S., Ph.D., Associate Adjunct Professor

Emeriti Faculty
Murray E. Fowler, D.V.M., Professor Emeritus
Donald G. Low, D.V.M., Ph.D., Professor Emeritus
William R. Pichard, 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
Donald R. Strombeck, D.V.M., Ph.D., Professor Emeritus

*Course not offered this academic year.*
Courses in Medicine (MVM)

Upper Division Course
198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses
200. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Chairperson in charge)
201. Group Study (1-5) I, II, III. The Staff Preceptor: resident in School of Veterinary Medicine or consent of instructor Group study in selected areas of the clinical sciences. (SU grading only.)

204. Research (1-12) I, II. The Staff (Chairperson in charge) (SU grading only.)

Professional Courses
401. Small Animal Clinic (1 1/2 week) I, II. The Staff (Ling in charge) Laboratory—50 hours total. Prequisite: 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 clinical supervision of the senior staff. May be repeated for credit. (SU grading only.)

402. Large Animal Medicine (1 1/2 week) I, II. The Staff (Smith in charge) Laboratory—50 hours total. Prequisite: 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. (SU grading only.)

403. Small Animal Medicine (1 1/2 week) I, II. The Staff (Ling in charge) Laboratory—50 hours total. Prequisite: 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. (SU grading only.)

404. Herd Health Management (1 1/2 week) I, II. The Staff Laboratory—50 hours total. Prequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents apply their knowledge of veterinary medicine, animal nutrition, genetics, husbandry, management, and economics in an on-the-job basis toward the improvement of food animal production efficiency through control and prevention of disease. (SU grading only.)

421. Veterinary Dermatology (3/4 week) I, II, III. The Staff Laboratory—25 hours. Prequisite: 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. (SU grading only.)

423. Pulmonary Diseases (3/4 week) I, II, III. The Staff Laboratory—25 hours. Prequisite: 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. (SU grading only.)

425. Zoo and Wildlife Medicine (3/4 week) I, II, III. The Staff Laboratory—25 hours. Prequisite: 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. (SU grading only.)

491. Small Animal Grand Rounds (1/2) I, II, III. The Staff (Ling in charge) Discussion—1 hour. Prequisite: 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. (SU grading only.)

492. Large Animal Grand Rounds (1/2) I, II, III. The Staff (Carlson in charge) Discussion—1 hour. Prequisite: professional standing as 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. (SU grading only.)

493. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Carlson and Smith in charge) Seminar—2 hours. Prequisite: professional standing, resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics related directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (SU grading only.)

Medieval Studies (College of Letters and Science)

Marjorie Osmor, Ph.D., Program Director (Fall/Winter)
Dennis Dutschke, Ph.D., Program Director (Spring)
Program Office, 220 Sprout Hall (916-725-1219)

Committee in Charge
Samuel G. Armstead, Ph.D., (Spanish)
Ingeborg Herthaler, Ph.D. (German)
Phyllis Justice, Ph.D. (History)
Winder McConnell, Ph.D. (German)
Marjorie Osmor, Ph.D. (English)
Larry Peterson, Ph.D., (French)
George VanDen Abbelee, Ph.D. (French)

The Major Program
The major in medieval studies is designed to introduce students to the main features of European civilization during the period from the fall of Rome to the beginning 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 is designed to give students a broad view of the period and to allow for 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 coursework in specific areas of history (the fall of Rome to the Renaissance); literature (Old and Middle English, Chaucer, romantic literature); French, German, Italian, Russian, and Spanish; and religious, art, and language, and political thought. In addition, each student must complete a senior thesis on some selected aspect of medieval culture.

Career Alternatives. The major in medieval studies is a liberal arts degree providing the student with a well-rounded education rather than specialized training, and is therefore particularly well prepared for the rigors of the profession: school as well as careers in law, library science, museology, journalism, and teaching.

A.B. Major Requirements:

Preparatory Subject Matter
Recommended: Art 1B, History 4A, Philosophy 21, Medieval Studies 20A, 20B, 20C, Religious Studies...

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
History: at least 12 units from History 102B, 121A, 121B, 121C, 121B

Literature: at least 12 units, including two courses from each of the following:

(a) English 111, 113A, 113B, 150A, 18B
(b) French 115, 141
(c) German 120, 122
(d) Italian 113A, 115A, 115B, 139B

Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190, Religious Studies 102, 110...

Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B

Dramatic Art 156, German 106, Music 121 (note prerequisite), 199, Rhetoric and Communication 110, 111

Political thought, at least one course from Political Science 115, 116, 118A

Senior thesis, Medieval Studies 190...

Total Units for the Major

Minor Advisers. W. McConnell (German), P. Justice (History), K. Roddy (Medieval Studies).

Minor Program Requirements:

Medieval Studies...

The minor in Medieval Studies is designed to be 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 romance language is recommended.

The minor must be designed in consultation with a Department Adviser.

Minor Advisers. D.J. Dutschke (Italian), W. McConnell (German), M. Osborn (English), K. Roddy (Medieval Studies).

Courses in Medieval Studies (MST)

Lower Division Courses

20A. Early Medieval Culture (4) I. The Staff Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codex Calixtinus, the Confessio of Saint Augustine, the Consolation of Philosophy of Boethius, Beowulf, the Nibelungenlied, and the Song of Roland. General Education credit: Civilization and Culture.

20B. The Culture of the High Middle Ages (4) II. The Staff 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.

20C. Medieval Transformations (4) III. The Staff
Lecture—2 hours; discussion—1 hour; paper or formal presentation. Course deals with 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. General Education credit: Civilization and Culture.

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—2 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) The Decline of Rome;
- (C) The Seven Liberal Arts, and their Significance in the Middle Ages;
- (D) The Papacy and the Church in State.

General Education credit for course 120A or 120B or 120C: Civilization and Culture.

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) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of 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.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)
299. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Microbiology

Microbiology (A Graduate Group)

Douglas C. Nelson, Ph.D., Chairperson of the Group
Group Office, 156 Hutchinson Hall (Microbiology Section), (916) 752-0920

Faculty. Participating faculty are in the Colleges of Letters and Science and Agricultural and Environmental Sciences, and the School 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. The group offers study in general microbiology, molecular biology, and cellular biology. Special areas of research include genetics and genomics, 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 advisor or the Chairperson of the group.

Graduate Advisers. S. Dandekar (Infectious and Immunological Diseases), P. E. LeFevre (Veterinary Microbiology and Immunology), D. M. Ogrydziak (Food Science and Technology), E. D. Suerink (Food Science and Technology).

Courses in Microbiology (MICB)

Graduate Courses

290C. Advanced Research Conference (1) I, II, III. The Staff (Nelson in charge)
Discussion—conference—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of talks on 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

(Microbiology)

(Military Science)

Military Science

(Military Science)

College of Letters and Science

Reserve Officers' Training Corps (ROTC), Army
Michael P. Tucker, L.T. Col., Chairperson of the Department
Department Office, 125 Hickey Gymnasium (916) 752-0541

Faculty

Lieutenant Colonel Michael P. Tucker, Professor
Captain John Porter
Captain Melissa A. Stanley
Captain Gary Thompson
Captain Alan Villandre

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 followship. 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 it 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 Challenge (a club designed for adventure activities such as rappelling, vertical rock climbing, paint gun wars, 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 leader 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 intramural 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 $100 subsistence per month after executing a contract agreeing to complete the course and accept a commission if offered. During the course all military science textbooks, 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

This program is designed for students who have not attended lower division Military Science classes. Instead of lower division courses an applicant attends a six-week summer camp (summer 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 ROTC scholarship pays $7000 or 80% annually of your college tuition, plus laboratory fees, on-campus education fees, attendance at Advanced Camp, and a gift book amount from which you may purchase textbooks, campus supplies and equipment. Scholarship winners also receive a tax-free subsistence allowance of $100 a month for 10 months for each year that the scholarship is in effect.

*Course not offered this academic year.
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 application. High school seniors may compete for an Early Cycles scholarship by submitting their application complete and postmarked by 15 July between their junior and senior years. A second application cycle is 1 November to 1 November. As high school seniors, students complete for the Regular Cycle scholarship by submitting their application complete and postmarked by 15 July between their junior year and senior year. Applicants not selected for the Early Cycle are considered for the Regular Cycle competition. Applicants will receive notification of their final status by 1 March of their senior year in high school. Interested students should see their high school counselor for an application or contact: UC Davis, Department of Military Science.

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 by 1 November of each year. The deadline for submission of an application is 15 January for the two-year scholarship and 15 February for the three-year scholarship. Additionally, students may win a two-week ROTC Advanced Camp (basic camp) in the two-year Program mentioned above. Students apply for these Army scholarships through the Military Science Department.

DASE Cooperative Program
The Department of the Army Scientific and Engineering (DASE) Cooperative Program is designed to support the U.S. Army's efforts to recruit, employ, and retain a science and engineer skilled work force as both military officers and civilian employees. Qualified students may receive financial assistance of up to $5,000 per year to pay for tuition, fees, books, lodging, and meals. Additionally, a $1,000 per year stipend is paid to ROTC Advanced Course students during their last two years in school.

DASE Cooperative students must work in a Department of the Army (DA) Civilian position for a minimum of 26 weeks, typically divided into two thirteen-week periods. At least one work period must be completed during the school year. While working, the DASE student will receive the regular pay and benefits for their grade. Students must be enrolled full time in an undergraduate program leading to a degree in either science or engineering and enroll, or be enrolled, in the U.S. Army ROTC program. In the first semester, freshmen military student applicant needs a high school minimum cumulative grade point average (GPA) of 2.75 on a 4.0 scale and a recommendation from the principal or guidance counselor. Other university applicants must have a 2.0 GPA and a minimum C average in all major fields of study. The DA civilian employees may set their standards above these averages.

Students choose to serve in either the Active Army or a Reserve Force Component and apply for available DA Civilian positions for a specified period of employment.

For complete information you may contact the Military Science Department or the Planning and Placement Work Learning and Career Center, the Engineering and Physical Science Program Manager.

Leadership Laboratory
During the course of the school year, several weekends and two hours per week are spent in the conduct of practical exercises. Exercises emphasize academic instruction including map reading, personnel order, defense, and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and icon navigation. All cadets are required to participate in exercises to gain leadership experience and to prepare for attendance at the Army ROTC Advanced Camp.

Military Qualifications Standards (MQS) System
During the program of study, students will become familiar with the MQS System. It is designed to articulate skills and knowledge that are required of ROTC commissioned and non-commissioned 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 serves as the basis for future branch-directed specialty training.

The 24 professional knowledge subject areas 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 (1.1).

 Lecture—1 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept. Impact of military-racial and Soviet military power on role of Army studied in context of current problems.

12. Introduction to Military Leadership (2).

 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 (1.3).

 Lecture—1 hour. Prerequisite: lower division status. Basic military-tactical theories and their application at the individual and squad level. Course introduces military tactical operations, and covers fundamental material. Prerequisite for course in 11 are applied to offensive and defensive tactics.

14A. Introduction to Military Leadership Skills (1.12).

 Laboratory—2 hours. Prerequisite: lower division status 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 (1.12).

 Laboratory—2 hours. Prerequisite: lower division status 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 elements of the Army. As students gain capabilities, supervisory controls are reduced. (P/NP grading only.)

14C. Introduction to Military Leadership Skills (1.12).

 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 (2.3).

 Lecture—2 hours. Prerequisite: lower division status; 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 (1.2).

 Lecture—2 hours. Prerequisite: lower division status; 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 (2.2).

 Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Intermediate leadership skills identified in course 22 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 (1.2).

 Laboratory—2 hours. Prerequisite: lower division status; 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 officer. (P/NP grading only.)

24B. Individual Military Leadership Skills (2.2).

 Laboratory—2 hours. Prerequisite: lower division status; 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 platoon supervisory positions, given responsibility commensurate with positions. (P/NP grading only.)

24C. Individual Military Leadership Skills (2.2).

 Laboratory—2 hours. Prerequisite: lower division status; 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 (2.3).

 Lecture—2 hours. Prerequisite: upper division status; course 22A or consent of instructor. Course addresses different types of power and influence a military leader may use, reviews counselling techniques, and introduces basic management skills. Instruction proceeds on the various branches in which a commissioned officer could serve.
Music

College of Lerners and Science
Christopher Reynolds, Ph.D., Chairperson of the Department.

144A. Military Training Leadership Skills (1/2) Lab.
Lecture—2 hours. Prerequisite: upper division status; courses 134A, 134B, 143C, and 141. Develops and exercises the leadership skills necessary to plan, coordinate, and conduct a training program through practical instruction and 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 (1/2) Lab.
Lecture—2 hours. Prerequisite: upper division status; courses 134A, 134B, 143C, and 141. Requires 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 cadet officer with appropriate level of responsibility. Students perform as cadet staff officers. (P/NP grading only.)

Emerit Faculty
Sydney R. Charles, Ph.D., Professor Emeritus
Albert J. McNiel, M.S., Professor Emeritus
Jeffrey W. Rose, M.A., Professor Emeritus
Richard G. Swift, M.A., Professor Emeritus
Academic Senate Distinguished Teaching Award

Faculty Affiliates in Applied Music
Donna Lee Brandon, M.S.M., Lecturer (organ)
Lois Brandywine, M.A., Lecturer (piano)
Tad Brody, B.A., (Bass)
Phoebe Craig, M.M., Lecturer (harp/choral)
Thomas Dorsett, B.M., Lecturer (strings)
Joel Elias, M.M., Lecturer (trombone)
Sarah Frierberg, D.M.A., Lecturer (guitar)
Stephanie Friedman, M.A., Lecturer (voice)
David Gruen, M.M., Lecturer (bassoon)
Edward Higgins, M.M., Lecturer (flute)
Stanley Lutenska, M.A., Lecturer (percussion)
Peter Nowlin, B.M., Lecturer (French horn)
Deborah Pittman, M.A., Lecturer (clarinet)
Stephen Schultz, M.M., Lecturer (Baritone flute)
Deborah Shidler, B.M.E. (oboe)

The UC Davis Contemporary Players
Ross Bauer, Director
Tad Brody, flute
Deborah Shidler, oboe
Deborah Pittman, clarinet
David Granger, bassoon
Peter Nowlin, French horn
Betty Wu, piano
Tracy Davis, percussion
Robert Samson Bich, violin and viola
Sarah Freiberg, cello
Thomas Dorsett, bass

The UC Davis Woodwind Quintet
Deborah Shidler, oboe
David Granger, bassoon
Deborah Pittman, clarinet
Tad Brody, flute
Peter Nowlin, French horn

The Major Program
The Bachelor of Arts degree in music at UC Davis provides both a broad liberal arts education and thorough training for a career in music. A fundamental grounding in music theory, music history, and performance during the first two years of study permits a music major to focus upon a special interest area in composition, analysis, history, performance, or secondary-school teaching during the last two years of undergraduate work. Approximately one-half of the music student’s college course work is in music, including three years of music theory, two years of music history, and participation in performing groups.

Student Performing Activities: The UCD Department of Music offers performance opportunities in the UCD Symphony Orchestra, Early Music Ensemble, Concert Band, University Chorus, Chamber Singers, and in chamber music ensembles. The large performing groups regularly perform concerts each year and the campus ensembles perform frequently in the weekly Thursday Noon Concerts sponsored by the Department. The large performing groups also give concerts in off-campus locations, throughout Northern California, and abroad, including tours to Europe, China, the Soviet Union, France, Poland, and Australia.

Facilities: The Department of Music’s facilities include a large collection of renaissance, early modern, baroque, and modern instruments, an electronic studio, practice and rehearsal rooms, and an excellent music library. The
library has holdings of well over 11,000 records, tapes, and CDs, and the collection of books and scores in the main library offers exceptional coverage of all aspects of music.

Career Alternatives. Students graduating with a degree in music are well prepared for careers in teaching (high school, community college, or university level), research, performance, professional composing, concert management, and music librarianship.

A.B. Major Requirements:

Preparatory Subject Matter


Music 30, 31, 32 as determined in consultation with major adviser, one year.

Depth Subject Matter

Music 104A, 104B, 104C

At least 12 units selected from Music 130I or 131, 141, 142, 143, 144, 145, 146, 147

At least 6 units selected from Music 107A, 107B, 107C (Note: only 3 units of electronic music may be counted toward the major), 108A, 108B, 111, 112, 113A, 113B, 119, 119A

At least 8 units in performance courses...8

Select from Music 130 or 131, 141, 142, 143, 144, 145, 146, 147

Total Units for the Major

92

Beginning and transfer students must take an examination in piano playing. Sufficient pianists 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.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music.


Minor Program Requirements:

Music

A minimum of sixteen units of upper division Music courses...16

Courses chosen with advisor's consent from Music 105, 107, 110, 129

A minimum of six units in upper division music performance courses (Music 141, 142, 143, 144, 145, 146) may count toward the minor...6

Lower division preparatory work to be determined in consultation with minor advisers.

Teaching Credential Subject Representative. See also the section on the Teacher Education Program.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. A.M. Busse Berger.

Courses in Music (MUS)

Lower Division Courses

1. Basic Musicianship (3) II, III. Bach

Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important, for example, primary level classroom teachers, actors, theatre directors, design-ers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

2A-2B-2C. Keyboard Competence (1-1-1) II-III. Valente

Laboratory—1 hour. Prerequisite: concurrent enrollment in course 4A-4B-4C; keyboard diagnostic exam (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, modula-
tions, to realize figured basses, and to harmonize a given melody at sight.

3A. Introduction to Music Theory (4) II, III. The Staff

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 2A. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture.

3B. Introduction to Music Theory (4) II, III. The Staff

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3A. Continuation of course 3A. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture.

4A-4B-4C. Elementary Theory (5-5-5) I, II, III. Va-

lente

Lecture/discussion—4 hours; practicum—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, har-
mony, score reading, analysis of repertoire. Intended primarily for music majors. Students enrolled concur-
rently in course 2A-2B-2C will receive only 4 units of credit for each quarter of course 4A-4B-4C.

5A-5B-5C. Intermediate Theory (4-4-4) I, II, III. Frank

Lecture/discussion—3 hours; practicum—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, II, III. The Staff

Lecture—3 hours; laboratory—1 hour. An intro-
duction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture.

24A. Introduction to the History of Music, I (4) I. Re-

yolds

Lecture—3 hours; listening section—1 hour. Prereq-
usite: course 4A or 3A (concurrently). Intended pri-
marily for majors in music. History of music from the late Baroque to the Classical Period.

24B. Introduction to the History of Music, II (4) II. Re-

yolds

Lecture—3 hours; listening section—1 hour. Prereq-
usite: course 24A, course 4B, or 4C (concurrently). Intended primarily for majors in music. History of music from the Classical Period to the nineteenth cen-
tury.

24C. Introduction to the History of Music, III (4) III. Re-

yolds

Lecture—3 hours; listening section—1 hour. Prereq-
usite: course 4B or 3B; course 4C (concurrently). Intended primarily for majors in music. History of music from the nineteenth century to the present.

25A. Introduction to the History of Music, IV (4) I. Busse Berger

Lecture—3 hours; listening section—1 hour. Prereq-
usite: courses 4C and 24C; course 5A (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from antiquity to around 1400.
110C. The Music of a Major Composer: Bach (4) I. I. I. III. The Staff

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. General Education credit: Civilization and Culture.

110D. The Music of a Major Composer: Mozart (4) II. Holoman

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. General Education credit: Civilization and Culture.

110E. The Music of a Major Composer: Haydn (4) II. Bloch

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. General Education credit: Civilization and Culture.

111. Choral Conducting (2) I. III. Hillier

Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral and chamber ensembles. Conducting of a chamber ensemble. Performance. For choral conducting majors. Only 15 credits may be applied to major requirements.

112. Instrumental Conducting (2) I. Holoman

Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting instrumental ensembles. Offered in alternate years. Only 15 credits may be applied to major requirements.

121. Topics in Music History and Criticism (4) I. Holoman; II. Busse Berger; III. Hillier

Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and consent of instructor. Historical problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit.

122. Topics in Analysis and Theory (4) II. Swanson; III. Bauer

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.

126. American Music (4) I. II. III. Hillier

Lecture—3 hours; listening—1 hour. Prerequisite: course 10 or 3A-3B or consent of instructor. Examinations of the development of music in the United States, including Native American music, African-American music, African-American music, and selected 20th-century composers and styles. Offered in alternate years.


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 instrumental and performing techniques, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of music. General Education credit: Civilization and Culture.


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) Violà da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.


Performance instruction—1 hour. Prerequisite: open to Music majors only; 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) Violà da gamba; (U) Recorder. May be repeated for credit.

141. University Symphony Band (2) I. I. I. I. 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. I. I. III. Hillier

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) I. I. I. 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. Sight-reading, rehearsal, and performance of music for band. May be repeated for credit. (P/NP grading only.)


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. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

190. Senior Seminar in Music (4) I. The Staff

Seminar—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor. Course 10C 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.


The Staff

Prerequisite: consent of instructor. (P/NP grading only.)


The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Music Research (4) I. Reynolds

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) II. Swift

Seminar—3 hours; term paper. Study and practice of exploratory 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.
Native American Studies

College of Letters and Science
Jack D. Forbes, Ph.D., Program Director
Program Office, 2401 Hart Hall (916-752-3237)

Committee in Charge
Steven J. Crum, Ph.D. (Native American Studies)
Jack D. Forbes, Ph.D. (Native American Studies, Anthropology)
Inés Hernandez, Ph.D. (Native American Studies)
Geoffrey C. Longfish, M.F.A. (Native American Studies)
Martha J. Macri, Ph.D. (Native American Studies, Anthropology)
David A. Robertson, Ph.D. (English)
Stefano Varese, Ph.D. (Native American Studies)

Faculty
Steven J. Crum, Ph.D., Assistant Professor
Jack D. Forbes, Ph.D., Professor
Inés Hernandez, Ph.D., Assistant Professor
George C. Longfish, M.F.A., Professor
Martha J. Macri, Ph.D., Assistant Professor
Stefano Varese, Ph.D., Professor

Emeriti Faculty
Cari N. Gorman, M.F.A., Lecturer Emeritus
Sarah Hutchison, M.A., Lecturer Emeritus
David Rising, M.A., Senior Lecturer Emeritus

The Major Program

Native American studies focuses upon the indigenous peoples of both North and South America. The program is interdisciplinary in its approach to the world of the American Indian 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 their selections upon a focus on the Native experience in North America (north of Mexico). Plan II encourages interested students to focus upon Meso-America with, however, some coursework on the Northwest coast of North America and South America. Plan III focuses upon South America, with some course work integrating themes across regional and cultural areas.

Career Alternatives. Native American studies is excellent preparation for a professional career such as teaching, law, human services, social work, or religious community. Graduate studies and agencies in these and related areas are looking for students with multidisciplinary backgrounds to fill positions which require knowledge and sensitivity relating to ethnic issues and cultural diversity.

A.B. Major Requirements:

Preparatory Subject Matter (Plans I, II, and III) ........................................... 20
Native American Studies 1 ................................................................. 4
Native American Studies 2, 33, 46, 55, 70, or three of the above courses and one course from History 17A, History 22, Anthropology 2 or 3 ................................................................. 16

Minor Program Requirements:

The Native American Studies minor provides an introduction to the Native experience in America by means of exposure to course work dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

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.

Ethno-History, Native American Studies 130A, 130B, 130C, or 133
Philosophy and values, Native American Studies 156, 157, or 160
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 upper division course selected in consultation with advisor.
Courses in Native American Studies (NAS)

Lower Division Courses

1. Introduction to Native American Studies (4) I. III. Crum
   Lecture/discussion—4 hours. Introduction to Native American Studies with emphasis upon basic concepts relating to indigenous American tribal and reservation societies, including intergovernmental relations.

10. Native American Experience (4) I, II. The Staff; III. Maci
   Lecture—4 hours. Introduction to American Indian historical and socio-cultural development with emphasis upon the U.S. area and upon those processes such as relations with non-Indians which have contributed to the current condition of Indian people. General Education credit: Contemporary Societies.

32. Native American Music and Dance (4)
   Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes.

33. Native American Art in the U.S. (4) I. Longfish
   Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon decoration, media, and function. Intention is to familiarize the student with a wide range of styles and techniques.

34. Native American Art Workshop (4) I, II, III.
   Longfish
   Lecture—1 hour; laboratory—6 hours; to be arranged—3 hours. 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. The Staff
   Lecture/discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research methodologies for 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.

55. Americanism: Native American Contributions to World Civilization (4) II. Varese
   Lecture/discussion—4 hours. Prerequisite: course 1 or 10 recommended. Introduction to ideological aspects of perception in Native American cultures. Values, world views, ethics and attitudes relating to human and non-human world provide constructive alternatives for the wider society in attempts to deal with contemporary environmental, political and social issues. General Education credit: Contemporary Societies.

70. Native American Perception (4) I. The Staff
   Lecture/discussion—4 hours. Prerequisite: course 1 or 10 recommended. 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.

107. Special Topics in Native American Languages (4) II. Maci
   Lecture—1 hour; 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.

112. History and Culture of the "Five Civilized Tribes" (4) II. Hutchison/Wilson
   Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people, found in southeast part of the U.S., called the "Five Civilized Tribes." Offered in alternate years.

115. Native Americans in the Contemporary World (4) II. Forbes
   Lecture/discussion—4 hours. Prerequisite: one of course 1, 10, 55, or 70. 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. Offered in alternate years. (Former course Anthropology 141B.) General Education credit: Contemporary Societies.

116. Native American Traditional Governments (4) II. The Staff
   Lecture—4 hours. Prerequisite: course 1; Anthropology 218; Study of early Native American Tribes; Governments, confederations, leagues, and alliance systems. Offered in alternate years.

117. Native American Governmental Decision Making (4) II. The Staff
   Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 2; 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.

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.

120. Ethnohistory of South American Indians (4)
   Lecture—4 hours. Prerequisite: course 1, 10, 55, or 70. Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interaction between Indians, Euro-Americans. Socioeconomical analysis of man indigenous areas and the development of national societies.

122. Native American Community Development (4) II. Varese
   Lecture—4 hours. Prerequisite: course 1; Applied Behavioral Science 151. Application of community development theory and techniques to the development problems of Native American communities. Offered in alternate years. (Former course 161.)

130A. Native American Ethno-Historical Development (4) II. Crum
   Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history in North America before 1770. General Education credit: Civilization and Culture.

130B. Native American Ethno-Historical Development (4) II. Crum
   Lecture—4 hours. Prerequisite: course 1; History 17A recommended. Study of Native American ethno-history in North America after 1780. General Education credit: Civilization and Culture.

130C. Native American Ethno-Historical Development (4) II. Crum
   Lecture—4 hours. Prerequisite: course 1; History 17A recommended. Study of Native American ethno-history in North America after 1890. General Education credit: Contemporary Societies.

133. Ethnohistory of Native People of Mexico and Central America (4) II. Varese
   Lecture/discussion—4 hours. Prerequisite: course 1, 10, 55, or 70. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous societies, including political and economic issues. Special topics in Native American ethno-history will be presented in each alternate year. General Education credit: Civilization and Culture.

157. Native American Religion and Philosophy (4) II. Hernandez
   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.

180. Native American Women (4) III. Hernandez
   Lecture—4 hours. Prerequisite: upper division standing; course 70 and Women's Studies 50 recommended. Examines the roles of the Native American woman from pre-Conquest to the current stage. Biographical studies of important women will be utilized. General Education credit: Contemporary Societies.

181A-181B-181C. Native American Literature (4-4-4) I-III. Hernandez
   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 and 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. General Education credit: Civilization and Culture.

188. Special Topics in Native American Literary Studies (4) I, II, III.
   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 and 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. General Education credit: Civilization and Culture.

190. Seminar in Native American Studies (2) III.
   The Staff (Forbes in charge)
   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, II, III.
   The Staff
   Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American political, cultural issues, development, culture, and thought. May be repeated for credit when a different topic is studied.

194HA-194HB. Special Studies for Honors Students (4-4) I-II.
   The Staff (Forbes 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.)

   The Staff (Forbes in charge)
   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. Forbes in charge
    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. (PINF grading only.)

197TC. Community Tutoring in Native American Studies (1-5) I, II, III. The Staff (Forbes in charge) Tutoring—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (PINF grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Forbes in charge)
    Prerequisite: upper division standing: consent of instructor. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Forbes in charge)
    Prerequisite: consent of instructor. (PINF grading only.)

Graduate Courses

200. Basic Concepts in Native American Studies (4) II. Chum
    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) I, II, III. The Staff (Forbes in charge)
    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 topics differ.

*212. Community Development for Sovereignty and Autonomy (4) I. 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.

*220. Colonialism/Racism and Self-Determination (4) III. Varese/Macri
    Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of imperial/colonial systems and their psychological 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.

*280. Ethnohistorical Theory and Method (4) III. Forbes
    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.

288. Group Study for Graduate Students (1-5) I, II, III. The Staff (Forbes in charge)
    Prerequisite: graduate standing, consent of instructor. (SU grading only.)

289. Special Study for Graduate Students (1-12) I, II, III. The Staff (Forbes in charge)
    Prerequisite: graduate standing, consent of instructor. (SU grading only.)

Nature and Culture

(College of Letters and Science)
Mark Wheelis, Ph.D., Program Director
Program Office, 2202 Storer Hall (916-752-0562)

Committee in Charge
Michael Barbour, Ph.D., Evolution and Ecology
Scott McLean, Ph.D., (Comparative Literature)
Ben Orlove, Ph.D., Environmental Studies, Anthropology
David Robertson, Ph.D., English
Art Shapiro, Ph.D., Evolution and Ecology
Gary Snyder, Ph.D., (Flora)
Lenora Timm, Ph.D., Linguistics
Robert Torrance, Ph.D., (Comparative Literature)
Mark Wheelis, Ph.D., (Microbiology)

Faculty
Scott McLean, Ph.D., Lecturer (Comparative Literature)
Ben Orlove, Ph.D., Professor (Environmental Studies)
Lenora Timm, Ph.D., Professor (Linguistics)
Mark Wheelis, Ph.D., Senior Lecturer (Microbiology)

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature and Culture 1</td>
<td>4</td>
</tr>
<tr>
<td>Nature and Culture 100</td>
<td>4</td>
</tr>
<tr>
<td>Environmental Studies 100, Zoology 125</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology/Environmental Studies 101</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology/Environmental Studies 133</td>
<td>4</td>
</tr>
<tr>
<td>English 184 or Native American Studies 181A</td>
<td>4</td>
</tr>
<tr>
<td>English 191B or 181C</td>
<td>4</td>
</tr>
</tbody>
</table>

Total units for the minor: 23-24

Courses in Nature and Culture (NAC)

Lower Division Courses

1. Intersections of Nature and Culture (4) III. The Staff
   Lecture/discussion—3 hours, term paper. 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, and human 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.

*100 The Culture of Nature: Theoretical Frameworks and Case Studies (4) II. The Staff
   Lecture/discussion—3 hours; term paper. Prerequisite: course 1, Biological Sciences 1C, and Comparative Literature 2D, and Comparative Literature 1 or 2, or 3, or English 3. In-depth study of one or two 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 for credit.

Nematology

(College of Agricultural and Environmental Sciences)
Howard Ferris, Ph.D., Chairperson of the Department
Department Office, 488 Hutchison Hall (916-752-6906)

Faculty
Edward P. Casswell, Ph.D., Assistant Professor
Howard Ferris, Ph.D., Professor
Scott L. Gardner, Ph.D., Assistant Professor
Bruce A. Jaffe, Ph.D., Associate Professor
Robert J. Kaya, Ph.D., Professor (Entomology)
Becky W. Westerdahl, Ph.D., Lecturer
Valerie M. Williamson, Ph.D., Assistant Professor

Emeriti Faculty
Benjamin F. Lownsbury, Ph.D., Professor Emeritus
Arindam R. Maigmani, Ph.D., Professor Emeritus
Dewey J. Raski, Ph.D., Professor Emeritus

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nematology</td>
<td>16-20</td>
</tr>
<tr>
<td>Entomology, 110, and Veterinary Microbiology</td>
<td></td>
</tr>
</tbody>
</table>

Two or three courses from one of the following areas: (a) Plant Science: Microbiology, Botany 120, 121, Entomology 100, 115, 153, 156, 158, Soil Science 111, Zoology 112, 142. (b) Entomology: Microbiology 102, Botany 120, 121, one upper division Entomology course, Soil Science 100, 111, Zoology 112, 142.


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 to the Graduate Studies section in this catalog for details.

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. Gardner
    Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to human environment, classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. summer. The Staff (Chairperson in charge)
    Prerequisite: consent of instructor. (PINF grading only.)

Graduate Courses

*220. Principles and Techniques of Nematode Taxonomy and Morphology (4) III. The Staff
    Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, tree-hand and histologic sections; presentation of illustrative material. Offered in alternate years.

*222. Advanced Plant Nematology (3) II. Casswell
    Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Review and investigation of relationship between parasitic nematodes and plants, the relationship between nematodes and their environment, and the relationship between nematodes and other biota. Biology of systems explored at the population, organism, and cellular levels. Offered in alternate years.

225. Nematode Taxonomy and Comparative Morphology (5) II. Gardner
    Lecture—2 hours; laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as plant and animal parasites. Offered in alternate years.

240. Biological Control in Insect and Plant Nematology (2) I. Jaffe, Kaye
    Lecture—1 hour; laboratory—3 hours or field trips. Prerequisite: upper-division course in entomology, nematology, or plant pathology. Biological control potential of nematodes against insect pests and of microorganisms against nematode pests. Offered in alternate years.

*Course not offered this academic year.
Neurobiology
(A Graduate Group)

Brian Muloney, Ph.D., Chairperson of the Group
Group Office, 2320 Storer Hall (916-752-8523)

Faculty. The group includes 28 faculty members from fourteen departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Neurobiology offers programs of study leading to the Ph.D. degree. Neurobiology 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. A. Ishida (Neurobiology, Physiology and Behavior), P. Pannekoek (Neurobiology, Physiology and Behavior).

Courses in Neurobiology (NEB)

Graduate Courses
200LA. Laboratory Methods in Neurobiology (6) I, II, III. The Staff Laboratory—16 hours. Prerequisite: graduate standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

200LB. Laboratory Methods in Neurobiology (3) I, II, III. The Staff Laboratory—9 hours. Prerequisite: graduate standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

210. Contemporary Research in Neurobiology (3) I. The Staff (Chairperson in charge) Lecture—2 hours, discussion—1 hour. Prerequisite: graduate standing in Neurobiology or consent of instructor. Series of lectures by faculty members presenting the intellectual and technical basis for their own research. May be repeated for credit once with consent of instructor.

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. (SU grading only.)

283. Neurobiological Literature (1) I, II, III. Muloney and Wilson Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. (SU grading only.)

290C. Research Conference in Neurobiology (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: graduate standing in Neurobiology or consent of instructor; course 299 (concurrently). Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Nutrition
(Graduate Group)

Barbara O. Schneeman, Ph.D., Chairperson of the Department
Department Office, 3135 Meyer Hall (916-752-4900)

Faculty
Kenneth H. Brown, M.D., Professor
Andrew J. Clifford, Ph.D., Professor
Kathryn C. Dowey, Ph.D., Professor
M.R.G. Greenwood, Ph.D., Professor
Lewis E. Grivetti, Ph.D., Professor (Nutrition, Geography)
Patricia Johnson, Adjunct Professor
Carl L. Keen, Ph.D., Professor (Nutrition, Internal Medicine)
Bo L. Lonnerdal, Ph.D., Professor (Nutrition, Internal Medicine)
Roger McDonald, Ph.D., Assistant Professor
Jo Ann Prophet, M.S., Lecturer
Robert B. Rucker, Ph.D., Professor (Nutrition, Biological Chemistry)

*Course not offered this academic year.*

Barbara O. Schneeman, Ph.D., Professor (Nutrition, Food Science and Technology, Internal Medicine)
Judit S. Stern, Sc.D., Professor (Nutrition, Internal Medicine)

Emeriti Faculty
Fredric W. Hill, Ph.D., Professor Emeritus
William C. Weir, Ph.D., Professor Emeritus
Francis J. Zeman, Ph.D., Professor Emeritus

Related 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.

Nut: If the student’s major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

Community Nutrition
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101 or 110, plus 111
Nutrition 118, 119 (2) .......................... 6
Nutrition 120 .................................. 4
Physiology 110 .................................. 5

Food Service Management
Preparation: plan in advance to include the required course prerequisites.
Food Science and Technology 100A-100B, 101A-101B......................... 10
Food Service Management 120, 120L, 122, 123, 124, 125 .......................... 11
Food Service Management 123 or Agricultural Economics 112 .................. 3-4

Nutrition and Food
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101, 111 .................................. 9
Nutrition 120 .................................. 4
Food Science and Technology 100A, 100B, 101A-101B ......................... 6
Physiology 110 .................................. 5

Nutrition Science
Preparation: plan in advance to include the required course prerequisites.
Biological Sciences 102 and 103 .......................... 6
Nutrition 110, 111 .................................. 9

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 graduate adviser.

Courses in Nutrition (NUT)

Lower Division Courses
10. Discoveries and Concepts in Nutrition (3) I, II, III. The Staff 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. General Education credit: Nature and Environment. To
receive GE credit, course 11 must be taken in a con- current or subsequent quarter.

11. Current Topics and Controversies in Nutrition (2) I, II, III. The Staff
Discussion—1/2 hour; oral reports, written reports, term paper. Prerequisite: course 10 (may be taken concurrently). 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. General Education credit: Nature and Environment. To receive GE credit, course 10 must be taken in a concurrent or previous quarter.

20. Food and Culture: An Introduction to Culture, Diet, and Cuisine (4) I. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geogrophy 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. General Education credit: Nature and Environment.

93. Public Issues in Nutrition and Food Science (1) II. Schneeman
Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (PnP grading only) (Same course as Food Science and Technology 83.)

99. Individual Study for Undergraduates (1-6) I, II, III. The Staff
Prerequisite: consent of instructor. (PnP grading only.)

Upper Division Courses

101. Introduction to Nutrition and Metabolism (4) I. Lerman
Lecture—4 hours. Prerequisite: Chemistry 6B; Physiology 2 or 110. Introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; toxicology; and the effects of malnutrition. Not open for credit to students who have taken courses 110 or 111.

110. Principles of Nutrition (5) I. Calvert (Animal Science) and Rucker (Nutrition); III. Hung (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 reproduction. Physiological basis of nutritional disorders.

111. Human Nutrition (4) II. McDonald
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of major phases of life cycle of humans.

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Measures (2) III. Brown
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 101 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate dietary intake (dietary records and recalls, food frequency lists), body composition (anthropometry, physiological methods), and clinical signs of malnutrition. Principles of validity and reliability and interpretation of results.

113. Nutritional Assessment: Biochemical Measures (2) I. The Staff (McDonald in charge)
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Analysis and interpretation of biochemical markers of human nutritional status including hematological, urine, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasizes the precision, accuracy, relevance, and interpretation of the values.

114. Developmental Nutrition (4) II. Keen
Lecture—4 hours. Prerequisite: course 110 or 111; course 111. Role of nutritional factors in embryonic and postnatal development.

115. Animal Feeds and Nutrition (4) II. Brown (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.

116A. Practicum in Diet Therapy (1) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 111; Physiology 110 (or the equivalent). Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

116B. Practicum in Diet Therapy (1) I, II, III. The Staff
Lecture—1 hour; laboratory—2 hours; extensive written assignments. Prerequisite: course 116A (may be taken concurrently); course 115A. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116A. Continuation of course 116A. (Deferred grading only pending completion of 116A-116B sequence.)

116B. Practicum in Diet Therapy (1) I, II, III. The Staff
Lecture—1 hour; laboratory—1 hour; extensive written assignments. Prerequisite: course 116B (may be taken concurrently); course 115A. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. Continuation of course 116A. (Deferred grading only pending completion of 116A-116B sequence.)

117. Experimental Nutrition (5) I. Clifford
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111; Biological Sciences 103; a laboratory course in methods of nutritional assessment. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic, and enzymatic techniques to current problems in nutrition.

118. Community Nutrition (4) II. Dewey
Lecture—4 hours; discussion—2 hours; laboratory—1 hour. 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.

120. Food and Drug and their Nutritional Implications (4) I. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biological Sciences 103; course 120 recommended. Advanced themes exploring food habits and their nutritional implications; pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary coven; overview and case histories.

122. Ruminant Digestive Physiology (3) III. Fadel and Macy (Animal Science)
Lecture—3 hours. Prerequisite: Physiology 110; Biological Sciences 102, 103; Microbiology 2 recommended. Study of nutritive utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

122L. Ruminant Nutrition Laboratory (3) II. Macy (Animal Science)
Lecture—2 hours. Prerequisite: course 122 (concurrent). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to ruminant digestive physiology and nutrition. The laboratory will deal with topics developed in lectures.

123. Nutrition of Non-Ruminant Animals (3) III. Klaing (Avian Sciences)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110 or 111. Biological Sciences 102, 103; upper division standing in biological or agricultural sciences recommended. Comparative nutrition of non-ruminant animals including domestic animals, wildlife, and man. Rejection of nutrition is body composition, feeding, intake, growth, disease, exercise, and stress. Discussion and laboratory exercises on the scientific method for answering questions in nutrition.

124. Nutrition and Feeding of Finfishes and Shellfishes (3) III. Hung and Conkin (Animal Science)
Lecture—3 hours. Prerequisite: course 110 or 115. Application of principles of nutrition to feeding of finfishes and shellfishes; feeding habits, gastrointestinal anatomy, digestive physiology, aquatic environment, nutrient requirements, diet formulation and quality control, and feeding practices of commercially cultured fishes.

129. Journalistic Practicum in Nutrition (2) III. Stern
Discussion—2 hours. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; 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. Offered in alternate years.

190. Proseminar in Nutrition (1) 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 environmental, clinical, nutrition in the developing community, national and international scope. May be repeated for credit with consent of instructor. (PnP grading only.)

190C. Nutrition Research Conference (1) II, III. The Staff (Schneeman 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. (PnP 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 nutrition, supervised by a faculty member. (PnP grading only.)

197. Tutoring in Nutrition (1-9) I, II, III. The Staff
Discussion—laboratory—6 hours. Prerequisite: Nutrition Science 103B, 110 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. (PnP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Schneeman in charge)
(PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5), I, II, III. The Staff (Schneeman in charge) (PnP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) I. 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 science. 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) II. The Staff (Rogers, Physiological Sciences, 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. Lonnorden, Keen
Learning—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metabolic functions and nutritional status of dietary minerals.

216. Advanced Diet Therapy (3) III. The Staff
Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease interactions at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

*Course not offered this academic year.
Nutrition

(College of Agricultural and Environmental Sciences)

The Major Program

The study of nutrition encompasses all aspects of the college, from prepreparation, and food industry majors. It is also important in the study of nutrition that 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 work must be done in the major for courses in the 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 the study of nutrition. These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition courses can be taken. Students who plan to continue in nutrition studies are well prepared for professional study in nutrition, dietetics, medicine, and other health sciences.

B.S. Major Requirements:

For convenience in planning programs, 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.

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8</td>
<td>English Composition Requirement</td>
</tr>
<tr>
<td>59-62</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>15</td>
<td>Biological Sciences (1A, 1B, 2A, 2B, 2C)</td>
</tr>
<tr>
<td>6</td>
<td>Chemistry (2A-2B-2C)</td>
</tr>
<tr>
<td>6</td>
<td>Phys. Ed. (1A-1B)</td>
</tr>
<tr>
<td>6</td>
<td>Statistics (13 or 15)</td>
</tr>
<tr>
<td>10</td>
<td>General Education</td>
</tr>
<tr>
<td>24</td>
<td>B.S./G.E. Education Requirement</td>
</tr>
<tr>
<td>26-28</td>
<td>Breadth/General Education</td>
</tr>
<tr>
<td>102</td>
<td>Biochemistry (Biological Sciences 102)</td>
</tr>
<tr>
<td>6</td>
<td>Nutrition 110, 111, 117</td>
</tr>
<tr>
<td>14</td>
<td>Nutrition courses selected from 112, 113, 114, 115, 116, 118, 122, 123, 123, 190, 194, 196, and 199</td>
</tr>
<tr>
<td>6</td>
<td>Restricted Electives (Biochemistry 101L)</td>
</tr>
<tr>
<td>6</td>
<td>Food science, 102L, 103L</td>
</tr>
<tr>
<td>10</td>
<td>Physiology Laboratory (Physiology 110L, 110L, plus an additional physiology course)</td>
</tr>
<tr>
<td>10</td>
<td>Additional nutrition or related biological and physical sciences</td>
</tr>
<tr>
<td>16-22</td>
<td>Total Units for the Degree</td>
</tr>
</tbody>
</table>

Major Adviser: B. L. Lomondal.

Advising Center for the major is located in 1151 Meyer Hall (916-752-2612).

Nutrition

(GAgricultural and Environmental Sciences)

The Major Program

The study of nutrition encompasses all aspects of the college, from prepreparation, and food industry majors. It is also important in the study of nutrition that 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 work must be done in the major for courses in the 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 the study of nutrition. These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition courses can be taken. Students who plan to continue in nutrition studies are well prepared for professional study in nutrition, dietetics, medicine, and other health sciences.

B.S. Major Requirements:

For convenience in planning programs, 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.

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8</td>
<td>English Composition Requirement</td>
</tr>
<tr>
<td>59-62</td>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>15</td>
<td>Biological Sciences (1A, 1B, 2A, 2B, 2C)</td>
</tr>
<tr>
<td>6</td>
<td>Chemistry (2A-2B-2C)</td>
</tr>
<tr>
<td>6</td>
<td>Phys. Ed. (1A-1B)</td>
</tr>
<tr>
<td>6</td>
<td>Statistics (13 or 15)</td>
</tr>
<tr>
<td>10</td>
<td>General Education</td>
</tr>
<tr>
<td>24</td>
<td>B.S./G.E. Education Requirement</td>
</tr>
<tr>
<td>26-28</td>
<td>Breadth/General Education</td>
</tr>
<tr>
<td>102</td>
<td>Biochemistry (Biological Sciences 102)</td>
</tr>
<tr>
<td>6</td>
<td>Nutrition 110, 111, 117</td>
</tr>
<tr>
<td>14</td>
<td>Nutrition courses selected from 112, 113, 114, 115, 116, 118, 122, 123, 123, 190, 194, 196, and 199</td>
</tr>
<tr>
<td>6</td>
<td>Restricted Electives (Biochemistry 101L)</td>
</tr>
<tr>
<td>6</td>
<td>Food science, 102L, 103L</td>
</tr>
<tr>
<td>10</td>
<td>Physiology Laboratory (Physiology 110L, 110L, plus an additional physiology course)</td>
</tr>
<tr>
<td>10</td>
<td>Additional nutrition or related biological and physical sciences</td>
</tr>
<tr>
<td>16-22</td>
<td>Total Units for the Degree</td>
</tr>
</tbody>
</table>

Major Adviser: B. L. Lomondal.

Advising Center for the major is located in 1151 Meyer Hall (916-752-2612).
Pathology

See Pathology (Medicine, School of); and Pathology (Veterinary Medicine), below.

Pathology

(School of Veterinary Medicine)

Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department

Department Office, 1125 Haring Hall (916-752-1365)

Faculty

Mark L. Anderson, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Brad C. Barr, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Arthur A. Lotter, M.D., Ph.D., Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

James S. Culic, D.V.M., Ph.D., Associate Professor

Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor

Charles A. Holmberg, D.V.M., Ph.D., Professor, School of Veterinary Medicine

Bill Johnson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Lucinda J. Lovelace, D.V.M., Ph.D., Associate Professor

N. James MacLachlan, B.V.Sc., Ph.D., Associate Professor

Christopher J. Miller, D.V.M., Ph.D., Assistant Adjunct Professor (Pathology, California Primate Research Center)

F. Charles Mohr, D.V.M., Ph.D., Assistant Professor

Peter F. Moore, B.V.Sc., Ph.D., Associate Professor

Harvey J. Olander, D.V.M., Ph.D., Professor

Bennie I. Osburn, D.V.M., Ph.D., Professor

Roy R. Pool, Jr., D.V.M., Ph.D., Professor

Deryck H. Read, B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

H.L. Shivaprasad, M.D., B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)

Anthony A. Stannard, D.V.M., Ph.D., Professor (Pathology, Medicine)

Dennis W. Wilson, D.V.M., M.S., Ph.D., Associate Professor

Emeriti Faculty

Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus

Donald L. Dungworth, B.V.Sc., Ph.D., Professor Emeritus

Peter C. Kennedy, D.V.M., Ph.D., Professor Emeritus

Jack E. Moultou, D.V.M., Ph.D., Professor Emeritus

Courses in Pathology (PVM)

Upper Division Course

799. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PAP grading only.)

Graduate Courses

281. Foreign Animal Diseases (3) III. Olanter Lecture—3 hours. Prerequisite: courses 215, and Veterinary Medicine 452, and 451 or 459. For students interested in research and teaching in tropical veterinary medicine. The diseases studied are the most important ones that currently ravage third-world countries, particularly Africa and Latin America. Offered in alternate years.

282. Tumor Pathology (3) I. The Staff (Dungworth in charge) Lecture—3 hours. Prerequisite: graduate standing or final-year veterinary student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in alternate years.

283. Comparative Avian Anatomy and Pathology (1-3) I. Lovelace Lecture—3 hours. Prerequisite: anatomy section—upper division undergraduates, graduates, and veterinary students; pathology section—third- 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 pathobiology and disease manifestations for students interested in avian diseases. Offered in alternate years.

284. Pathogenesis of Infectious Disease (2) I. Culic Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sciences and introductory courses in microbiology, immunology, hematology, or consent of instructor. Features of pathogenesis and the defense mechanisms common to infections with bacteria, viruses, fungi, and protozoa are emphasized, as well as the important species differences. Parasite immune responses of domestic animals are also covered. Offered in alternate years.

285. Special Topics in Advanced Special Pathology (2-11) I, II, III. The Staff (Dungworth in charge) Lecture—variable. Prerequisite: graduate standing, DVM degree, or final-year veterinary student. Varied topics. See department for details. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

287. Comparative Pathology of Laboratory Animals (3) I. Lovelace Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor. Discussion of diseases commonly seen in laboratory animals. Offered in alternate years.

290. Seminar in Veterinary Pathology (1) I, II, III. The Staff Seminar—1 hour. (SU grading only.)

291. 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. (SU grading only.)

292. Surgical Pathology Conference (1) I, II, III. The Staff (Pool in charge) Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of cases: current surgical pathology cases based on clinical records and microscopic study. (SU grading only.)

293. Necropsy and Surgical Pathology (1-4) I, II, III. The Staff (Olander 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. (SU grading only.)

294. Comparative Pathology Conference (1) I, II, III. Lovelace 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
Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (under Medicine, School of); Pharmacology and Toxicology (A Graduate Group), below; and Veterinary Pharmacology and Toxicology

Pharmacology and Toxicology (A Graduate Group)

David E. Hinton, Ph.D., Chairperson of the Group
Group Office, 4111 Meyer Hall (Department of Environmental Toxicology, 916-752-4516)

Faculty. The 50 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). Areas of research specialization are broad in scope and include clinical pharmacology and toxicology, environmental ecotoxicology, genetic and development pharmacology and toxicology, pharmacology and toxicology, and respiratory pharmacology and toxicology. 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. Plotter (Veterinary Anatomy and Cell Biology), A.J. France, (Medical Pharmacology and Toxicology), J.A. Last (Pulmonary Medicine), B.W. Wilson (Environmental Toxicology).

Courses in Pharmacology and Toxicology (PTX)

Graduate Courses
201. Principles of Pharmacology and Toxicology I (5)(I Miller (Environmental Toxicology)
Lecture—5 hours. Prerequisite: Biological Sciences

203. Physiology I. Basic concepts underlying metabolic and pharmacologic, receptor and cell biology, and the therapy for cancer and infectious disease. Specific topics include the role of cellular pathways, disease processes, drugs, and specific cellular responses related to cells and tissues. Prerequisites: satisfactory completion of course 201, Mehanisms of action, pharmacologic, and institutional changes produced by drugs and other chemical substances on various body systems and their associated organs.

203. Principles of Pharmacology and Toxicology II (5) II. Buckpitt (Veterinary Pharmacology and Toxicology)
Lecture—5 hours. Prerequisite: satisfactory completion of course 201. Mechanisms of action, pharmacologic, and toxicologic changes produced by drugs and other chemical substances on various body systems and their associated organs. Ecotoxicity, risk assessment and epidemiology.

236. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff
Lecture/discussion/seminar—1 hour each course (course format can vary at option of instructor). Prerequisites: 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.

250. Seminar (1) I, II, III. The Staff
Current topics in pharmacology and toxicology. (SU grading only)

Philosophy

(Chairman of the College and Science)
Michael V. Wedin, Ph.D., Chairperson of the Department
Department Office, 409 Surgeon IV (916-752-0807)

Faculty
Philip M. Clark, III, Ph.D., Assistant Professor
David I. Coop, Ph.D., Professor
Joel I. Friedman, Ph.D., Professor
James R. Griesemer, Ph.D., Associate Professor
Michael Jubit, Ph.D., Professor
Jeffrey King, Ph.D., Associate Professor
John P. Malcom, Ph.D., Professor
George J. Matthey, Ph.D., Professor
Paul Teller, Ph.D., Professor
Michael V. Wedin, Ph.D., Professor
Richard A. Woods, M.A., Visiting Professor
Emeriti Faculty
Ronald A. Arbini, Ph.D., Professor Emeritus
William H. Bossart, Ph.D., Professor Emeritus
Neal W. Gilbert, Ph.D., Professor Emeritus
Marjorie Grene, Ph.D., Professor Emeritus

The Major Program
Philosophy is the study of conceptual problems that pertain to the nature of knowledge, reality, and human conduct.

The Program. The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and aesthetics. In addition, upper division course work is given in the fields of philosophy of mathematics, moral and political philosophy, philosophy of religion, philosophy of the natural and social sciences, and philosophy of language. Philosophy is also a subject in which the problems discussed recur, or have important roots in past discussion. The philosophy of history is thus important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. The department therefore places great emphasis on the history of philosophy, and provides courses in the major figures and traditions of western philosophy, as well as in the influential contemporary schools of the continental and analytic varieties.

Career Alternatives. Many students major in philosophy with a plan to do graduate work and teach philosophy, or as background training for other professions. Philosophy majors do very well in law schools and medical schools, for example. Also, many philosophy majors go on to advanced work in other academic areas in the humanities and social sciences. Graduates may also go into such fields as government, the ministry, publishing, social work, and even business.

A.B. Major Requirements:

Preparatory Subject Matter ................................. 16
Philosophy 12, 21, 22, 23 ............................ 16
Depth Subject Matter .................................... 36
Upper division units in Philosophy selected with approval from the major adviser .......................... 36
Total Units for the Major .................................. 52


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 major adviser. The range of choice in the logic specialization is limited to the courses listed.

Units
Philosophy—General ...................................... 20
Philosophy 12 or Math 108 ... 4
Philosophy 112 .............................................. 4
Select units from Philosophy 113, 131, 132, 133, 134, 135, 136, 137, 138, 139 ........................ 4


Courses for Non-Majors. The department offers a range of courses for non-majors. Philosophy 1 is a General Education course for the non-major. Students pursuing careers in education and engineering might find Philosophy 5 especially useful, since this course provides practice in concise and logical writing. Science and mathematics students may find this course useful, as well as Philosophy 12, 107, 108, and 112. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14, 114, 115, 118, and 119. The offerings at the upper division level include courses of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

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. M. Jubit.
Courses in Philosophy (PHI)

Lower Division Courses

1. Introduction to Philosophy (4) I. Weinid, T. Teller; III. M. Lebel
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. General Education credit: Civilization and Culture.

2. History of Philosophy: Eighteenth Century (4) III. Matley
Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture.

3. Introduction to Ethics and Political Philosophy (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical 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? General Education credit: Civilization and Culture.

4. Appraising Scientific Reasoning (4) II. 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. General Education credit: Civilization and Culture.

5. Critical Reasoning (4) I. Friedman
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; values and validity. Not open to students who have completed course 6.

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; values and validity. Not open to students who have completed course 6.

11. Philosophy East and West (4) II. Friedman
Lecture/discussion—4 hours. Comparative treatment of select theories in Eastern and Western philosophy, e.g., of self, God, being, knowledge, enlightenment. Topics selected from the following philosophers: Eastern—Buddhist, Confucian, Hindu, Taoist; and Western—Platonic, Aristotelian, Medieval Christian, Modern Rationalist/Epimute, Kantian, Hegelian, Existentialist. Offered every third year; former course 10E. General Education credit: Civilization and Culture.

12. Introduction to Symbolic Logic (4) I. King

13. The Person (4) I. Pitchem
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. General Education credit: Civilization and Culture.

14. Ethical and Social Problems in Contemporary Society (4) III. The Staff
Lecture—3 hours; term paper. Philosophical issues and problems in contemporary morality and social problems. Among possible topics: are civil disobedience and revolution, racial and sex discrimination, environment and population control, genetic engineering, technology and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture.

20. Lower Division Seminar in Philosophy (2) III. S. Lewis
Seminar—1.5 hours; term paper. Prerequisite: completion of fewer than 42 quarter units. A seminar in which the abstract ideas and concepts of business, economics, and politics will be discussed. Prerequisite: permission of instructor. Enrollm ent limited to 15 students.

21. History of Philosophy: Ancient (4) I. McElroy
Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. General Education credit: Civilization and Culture.

22. History of Philosophy: Seventeenth Century (4) I. Mühlbauer
Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz and seventeenth-century scientific thinkers. General Education credit: Civilization and Culture.

23. History of Philosophy: Eighteenth Century (4) III. Matley
Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture.

24. Introduction to Ethics and Political Philosophy (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical 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? General Education credit: Civilization and Culture.

38. Directed Group Study (1-5) III. Rubinstein
Lecture—1 hour. Prerequisite: consent of instructor (P/NP grading only).

39. Special Study for Undergraduates (1-5) I., II., III. The Staff
Lecture—1 hour. 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. Buben
Lecture—3 hours; discussion—1 hour. Prerequisite: course one in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, personal identity, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. General Education credit: Civilization and Culture.

102. Theory of Knowledge (4) I. Matley

103. Philosophy of Mind (4) I. Wolfheim
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.

104. Introduction to Philosophy of Science (4) I. Teller
Lecture—3 hours; discussion—1 hour. Prerequisite: course one in philosophy or a science background recommended. Basic problems in the philosophy of science: the relationship of the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. General Education credit: Civilization and Culture.

105. Philosophy of Religion (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course one in philosophy recommended. Logical, metaphysical, theological, and historical aspects of selected religious concepts and problems. General Education credit: Civilization and Culture.

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, realism.

*Course not offered this academic year.

107. Philosophy of the Physical Sciences (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: one philosophy course or a science background recommended. Nature and limitations of the scientific method. Nature of scientific laws, theories, explanations, and models. Problems of causality, determinism, indeterminism, and probability, the structure of scientific revolutions. General Education credit: Civilization and Culture.

108. Philosophy of the Biological Sciences (4) I. Dietrich; III. Griesemer
Lecture—3 hours; discussion—1 hour. Prerequisites: one philosophy course or consistent understanding of scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and socioeconomic science and human values. General Education credit: Civilization and Culture and Nature or Environment.

109. Philosophy of the Social Sciences (4) II. The Staff
Lecture/discussion—4 hours. Prerequisite: one philosophy course or a science background recommended. Nature of human action and behavior, and of explanation of behavior. Nature of laws and explanation in the social sciences. Problems in the social sciences such as interpretive understanding, role of prediction, behavioralism, reductionism, role of value judgments, and social rules.

110. An Historical Introduction to the Philosophy of Science (4) II. The Staff
Lecture/discussion—4 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.

111. Philosophy of Space and Time (4) II. The Staff
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, relativism, absolutism, and the relativists' views of space and time, philosophical implications of relativity theory.

112. Intermediate Symbolic Logic (4) II. Teller
Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or consent of instructor. Predicate logic, symbolic and logical syntax and semantics. Transcription between predicate logic and English. Proof techniques. Identity, functions, and definite descriptions. Introduction to concepts of meta-mathematics. 

113. Advanced Logic (4) II. King
Lecture/discussion—4 hours. Prerequisite: course 112, or Mathematics 108 or the equivalent. Topics will vary between metalogic of First-Order logic though the Completeness and Lowther-Skolem theorems, or Zermelo-Fraenkel set theory axiomatized as a First-Order theory. May be repeated once when subject areas differ.

114. History of Ethics (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: one philosophy course. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

115. Problems in Normative Ethics (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Course one course in philosophy recommended. An examination of those ethical issues which are central to our understanding of the nature of moral life, justice and health care, war, nuclear deterrence, world hunger, environmental protection.

116. Ethical Theories (4) II. The Staff
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 contractualism.

117. Foundations of Ethics (4) II. Copp
Lecture/discussion—3 hours, term paper. Prerequisite: one of courses 114, 115, 116, 101, or 137. Advanced philosophical discussions 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 relativity, moral skepticism, normative language and normative belief.

118. Political Philosophy (4) II. Copp
Lecture/discussion—3 hours, term paper. Prerequisite: one course in philosophy. Intensive examination of some philosophical concepts of politics such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. General Education credit: Contemporary Societies. (Former course 117.)

119. Philosophy of Law (4) I. Copp
Lecture/discussion—4 hours, term paper. Prerequisite: one course in philosophy. Analysis of political concepts such as justice and human nature, and 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 relativity, moral skepticism, normative language and normative belief.

120. Topics in Metaphysics (4) II. Jubien
Lecture/discussion—4 hours, term paper. Prerequisite: course 101. Advanced philosophical topics in metaphysics, e.g., the problem of personal identity, the nature of consciousness, the nature of mental events and processes, the nature of the self, the nature of time, and the nature of reality.

121. Topics in the History of Knowledge (4) II. Matley
Lecture/discussion—4 hours, term paper. Prerequisite: course 102. Survey of major philosophical movements in the history of knowledge, e.g., the philosophy of science, the philosophy of language, the philosophy of mind, and the philosophy of art.

122. Aesthetics (4) II. Wolheim
Lecture/discussion—4 hours, term paper. Prerequisite: one course in philosophy, e.g., the philosophy of language, the philosophy of mind, or the philosophy of art. Advanced philosophical topics in aesthetics, e.g., the nature of beauty, the nature of art, the nature of taste, and the nature of aesthetic experience.

123. Philosophy and Economics (4) II. The Staff
Lecture/discussion—3 hours, term paper. Prerequisite: one upper division course in philosophy. Study of the nature of economic and political philosophy, e.g., the nature of value, the nature of justice, and the nature of moral obligation.

131. Philosophy of Logic and Mathematic (4) II. Jubien
Lecture/discussion—3 hours, term paper. Prerequisite: course 12 or one course in philosophy, e.g., the philosophy of language, the philosophy of mind, or the philosophy of art. Advanced philosophical topics in the philosophy of logic, e.g., the nature of logical truth, the nature of logical consequence, and the nature of logical systems.

132. History of Logic (4) II. Friedman
Lecture/discussion—3 hours, term paper. Prerequisite: one course in philosophy, e.g., the philosophy of language, the philosophy of mind, or the philosophy of art. Advanced philosophical topics in the history of logic, e.g., the nature of logical truth, the nature of logical consequence, and the nature of logical systems.

133. Topics in Mathematical Logic (4) III. The Staff
Lecture/discussion—4 hours, term paper. Prerequisite: course 113 or Mathematics 105 or consent of instructor. Topics to be taken typically from the following: metalinguistic and model theory; axiomatic set theory; independence results; Gödel's incompleteness theorems; computability theory; proof theory, etc.

134. Modal Logic (4) II. King
Lecture—3 hours, discussion—1 hour. Prerequisite: course 112 or Mathematics 108 or the equivalent. Survey of the main systems of modal logic, including Lewis's worlds S4 and S5. "Possible worlds" semantics and formal proofs. Applications to epistemology, ethics, or temporality. Offered in alternate years.

135. Alternative Logics (4) II. Matley
Lecture/discussion—4 hours. Prerequisite: course 12. Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and non-monotonic logics.

137. Philosophy of Language (4) II. The Staff
Lecture/discussion—3 hours, term paper. Prerequisite: one course in philosophy or linguistics. Discussion of philosophical theories of language, the nature of language, and the nature of meaning. Study of the nature of language, the nature of meaning, and the nature of communication.

143. Hellenistic Philosophy (4) II. The Staff
Lecture/discussion—3 hours, term paper. Prerequisite: course 21.

145. Medieval Philosophy (4) III. Malcolm
Lecture/discussion—3 hours, written reports. Prerequisite: course 21. Study of major philosophers in the medieval period.

151. Philosophy of the Nineteenth Century (4) I. The Staff
Lecture/discussion—4 hours, term paper. Prerequisite: courses 21, 22, or 23 recommended. Advanced philosophical topics in the philosophy of the Nineteenth Century, e.g., the philosophy of science, the philosophy of art, and the philosophy of religion.

155. American Philosophy (I) II. The Staff
Lecture/discussion—3 hours, term paper. Prerequisite: one course in philosophy recommended. Study of American philosophers, e.g., the philosophy of the American Revolution, the philosophy of the American Civil War, and the philosophy of the American West.

156. Phenomenology and Existentialism in Germany (4) I.
Lecture—3 hours, term paper. Prerequisite: course 23 recommended. Study of the philosophy of phenomenology, e.g., the philosophy of Husserl, Heidegger, and Jaspers.

157. Phenomenology and Existentialism in France (4) II.
Lecture—3 hours, term paper. Prerequisite: course 23 recommended. Study of the philosophy of phenomenology, e.g., the philosophy of Sartre, Merleau-Ponty, and de Beauvoir.

160. Pre-Socratics (4) III. Malcolm
Lecture/discussion—3 hours, term paper. Prerequisite: course 21. Study of the philosophy of the pre-Socratic philosophers, e.g., the philosophy of Thales, the philosophy of Anaximander, the philosophy of Parmenides, and the philosophy of Zeno.

161. Plato (4). Malcolm
Lecture/discussion—3 hours. Prerequisite: course 21.

162. Aristotle (4). Malcolm
Lecture/discussion—4 hours. Prerequisite: course 21 or consent of instructor.

166. Descartes (4) III. Friedman
Lecture/discussion—4 hours, term paper. Prerequisite: course 22. Study of the philosophy of Descartes, e.g., the philosophy of mind, the philosophy of science, and the philosophy of religion.

169. Spinoza (4) I. Friedman
Lecture/discussion—4 hours, term paper. Prerequisite: course 22.

170. Leibnitz (4) I. Matley
Lecture/discussion—3 hours, term paper. Prerequisite: course 22.

172. Locke and Berkeley (4) I. Matley
Lecture—4 hours, term paper. Prerequisite: course 23. Study of the philosophy of Locke, e.g., the philosophy of mind, the philosophy of language, and the philosophy of science.

174. Hume (4) I. Matley
Lecture/discussion—4 hours. Prerequisite: course 23 recommended.

175. Kant (4).
Lecture/discussion—4 hours. Prerequisite: course 23. Study of the philosophy of Kant, e.g., the philosophy of mind, the philosophy of language, and the philosophy of science.

177. Hegel (4) II.
Lecture/discussion—4 hours. Prerequisite: course 23 recommended.

190. Special Topics in the History of Philosophy (4) III. The Staff
Lecture—3 hours, term paper. Intensive study of special topics in the history of philosophy. May be repeated for credit.

193. Research in Philosophy (2) I, II, III. The Staff
Lecture (Chairperson in charge) 1 hour, term paper/discussion—2 hours. Prerequisite: consent of instructor. Individual research resulting in a formal paper on a specific topic in one of several fields of philosophy. May be repeated twice for credit.

194HA 194HB. Honors Research Project (4) I, II, III. The Staff (Chairperson in charge) 1 hour, term paper. Intensive study of special topics in the history of philosophy. May be repeated twice for credit.

194HA 194HB. Honors Research Project (4) I, II, III. The Staff (Chairperson in charge) 1 hour, term paper. Intensive study of special topics in the history of philosophy. May be repeated twice for credit.

195. 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. Metaphysics (4) III. Jubien
Seminar—4 hours.

202. Theory of Knowledge (4) I. Friedman
Seminar—4 hours.

204. Philosophical Argumentation (4) I. The Staff
Seminar—4 hours. Prerequisite: graduate standing in philosophy. Intensive study of argumentation, e.g., the nature of argument, the nature of reasoning, and the nature of persuasion.

207. Philosophy of Physics (4) II. The Staff
Seminar—4 hours. Prerequisite: graduate standing in philosophy. Intensive study of the philosophy of physics, e.g., the nature of space, the nature of time, and the nature of causality.

208. Philosophy of Biology (4) I. Griesemer
Seminar—3 hours, term paper. Prerequisite: graduate standing in philosophy. Intensive study of the philosophy of biology, e.g., the nature of biological knowledge, the nature of biological processes, and the nature of biological evolution.

210. Philosophy of Science (4) I. Teller
Seminar—3 hours, term paper. Prerequisite: graduate standing in philosophy. Intensive study of the philosophy of science, e.g., the nature of scientific explanation, the nature of scientific realism, and the nature of scientific discovery.

212. Philosophy of Logic and Mathematics (4) II. Friedman
Seminar—3 hours, term paper. Prerequisite: course 112 or Mathematics 108 or the equivalent. Intensive study of the philosophy of logic and mathematics, e.g., the nature of logical and mathematical truth, the nature of logical and mathematical objects, and the nature of logical and mathematical proofs.

*Course not offered this academic year.
214. Ethics (4) II. The Staff Seminar—3 hours; term paper.

217. Political Philosophy (4) I. Copp 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 language. May be repeated for credit with consent of instructor when the content is sufficiently distinct.

261. Plato (4) II. Malcolm Seminar—3 hours.

262. Aristotle (4) II. Wedin Seminar—3 hours.

273. Kant (4) I. Matley Seminar—3 hours.

280. History of Philosophy (4) II. Friedman Seminar—3 hours. Special topics in the history of philosophy.

283. The Emotions (4) I. Wolin Seminar—3 hours; term paper. Prerequisite: graduate standing. Paper to be underwritten 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.

289. Group Study (1-5) I. Teller, II. Wolin

299. Research (1-12) I, II. III. The Staff (Chairperson in charge) (SU grading only.)

**Physical Education**

(College of Letters and Science)

Keith R. Williams, Ph.D., Chairperson of the Department

Department Office, 284 Hickey Gymnasium (916-752-0511)

Faculty
G. Robert Biggs, B.A., Associate Supervisor
Bobbie J. Bridgen, M.A., Associate Supervisor
Stephen T. Bronzon, M.S., Lecturer
Joseph E. Carlson, M.A., Supervisor
Simon Davies, Ph.D., Lecturer
Kathleen M. DeYoung, B.A., Supervisor
Patricia L. Gillion, M.A., Supervisor
Raymond S. Gottstat, M.A., Supervisor
David Hawkins, Ph.D., Assistant Professor
Jerry W. Hinshel, A.B., Supervisor
Jorja E. Holth, M.S., Lecturer
Robert G. Holly, Ph.D., Associate Supervisor
Barbara A. Jahns, M.S., Supervisor
Susan E. Jennings, Ph.D., Lecturer
Paul A. Mole, Ph.D., Professor
Joseph E. Vochatzer, M.A., Supervisor
Keith R. Williams, Ph.D., Associate Professor
Robert A. Williams, M.A., Lecturer
Susanne 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
Walter S. Letter, Ed.D., Senior Lecturer Emeritus
E. Dean Ryan, Ed.D., Professor Emeritus

**The Major Program**

The major in physical education provides a broad, scholarly understanding of human movement.

The Program. The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is designed 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 physical education, 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 designed for students desiring more intense curriculum in the natural sciences. It involves more extensive physical and life science preparation in lower division courses, and requires additional upper division course work more specific to either biomechanics or exercise physiology. This degree program provides preparation for graduate study in exercise and sport science, for careers in the area of health sciences, and for professional schools in medicine, physical therapy, and podiatry.

**A.B. Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>32-35 UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 2A, 2B</td>
<td>10</td>
</tr>
<tr>
<td>Physical Education 45</td>
<td>3</td>
</tr>
<tr>
<td>Physics 1A, 5A</td>
<td>3-4</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>3-4</td>
</tr>
<tr>
<td>Additional requirements:</td>
<td></td>
</tr>
<tr>
<td>Biological emphasis—Biological Sciences 1B</td>
<td>1B</td>
</tr>
<tr>
<td>Psychological emphasis—Psychology 41</td>
<td>1B</td>
</tr>
</tbody>
</table>

**Depth Subject Matter**

| Cell Biology and Human Anatomy 101 | 4 |
| Cell Biology and Human Anatomy 101L | 2 |
| Physical Education 101, 101L, 102, 103, 104, 109 | 16 |
| Physiology 110 | 5 |
| Minimum of 12 upper division units in physical education chosen with approval by a major adviser | 12 |

**Biological emphasis:**

Students selecting this emphasis must select a minimum of 9 units from Physical Education 110, 111, 112, 113, 115, 117, or 118.

**Psychological emphasis:**

Students selecting this emphasis must select a minimum of 7 units from Physical Education 120, 121, 122, or 125.

Minimum of 4 upper division non-physical education units in either the biological or the psychological area selected from the following list. Substitutions may be made only with the prior written approval of a major adviser.

**Biological emphasis:**

- Anthropology 101, 102 or 153, Physiology 113, Genetics 100, or Nutrition 110 | 4 |

**Psychological emphasis:**

- Psychology 114, 115, 136, 143, 145, or 160 | 4 |

No variable-unit course work may be used to fulfill these requirements. Consult your advisor regularly.

**Total Units for the Major**

75-77

*Course not offered this academic year.

B.S. Major Requirements:

**Preparatory Subject Matter**

| Biological Sciences 1A | 5 |
| Chemistry 2A-2B or 2AH-2BH | 10 |
| Computer science (Computer Engineering 10, 15, 33, or Engineering 51) | 4 |
| Mathematics 16A-16B or 21-21B | 6-8 |
| Physical Education 45 | 3 |
| Physics 1A-5A or 5B-5B | 8 |
| Psychology 1 or 15 | 3-4 |
| Statistics 13 or 102 | 4 |

**Additional Requirements**

| Plant and Animal Sciences | Biological Sciences 13, and Physics 5C or 9C | 4 |

**Exercise Physiology emphasis:**

- Chemistry 8A-8B, or 116A-116B | 8 |

**Depth Subject Matter**

| Cell Biology and Human Anatomy 101, 110L | 4 |
| Physical Education 110, 101L, 102, 103, 104, 105 | 16 |
| Physiology 110, 111, 112, 113, 115, 117, 118 | 7 |

Restricted electives | 24 |

1. Minimum of 12 upper division units from outside the major selected with advisor's approval and as specified. Substitutions may be made only with the prior written approval of a major adviser.

2. Minimum of 12 upper division units of Physical Education courses, including at least 9 units from: Biomechanics emphasis—Physical Education 113, 115, 125.

**Exercise Physiology emphasis:**

at least 9 of the 12 units must be selected from Physical Education 110, 111, 112, 113, 115, 117, 118.

No variable-unit coursework may be used to fulfill these requirements. Consult your advisor regularly.

**Total Units for the Major**

108-113

**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 Physical Education 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 E.S. degree total unit requirement.

**Major Advisers:**


**Teaching Major**

The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

**Minor Program Requirements:**

**Physical Education**

At least 18 upper division units in physical education from one of three options: 18

1. **Biomechanics**

- Physical Education 103 and one course from 101, 102, 104, 105

2. **Minimum of 2 courses from**

- Physical Education 5A-5B or 5B-5B

3. **Additional courses to complete a total of 18 upper division units.**

b. **Exercise Physiology**

- Physical Education 101 and 101L, and one course from 102, 103, 104, 165
2. Principles of Basic Exercise Conditioning (2 I). Swaminathan 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., the theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, environmental changes, age, and gender on fitness levels. (IPNP grading only.)

5. Foundations of Emergency First Aid Services (2 I, II, III). The Staff (in charge). Lecture—1 hour; laboratory—1 hr. An introduction to the basic principles and practices that fulfill the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.

6. Preparation and Participation in ICA Competition (1) II, III. ICA Staff (Director in charge) Discussion—laboratory—10—20 hours. Prerequisite: consent of instructor (coach). Preparation and participation in Intercolliegiate 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 Physical Education for a combined total of 6 units. (IPNP grading only.)

7. Professional Physical Education Activities: Men and Women (1) II, III. The Staff (Chairperson in charge) Lecture—1 hour; laboratory—2 hours. Fundamentals 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) II. 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) II, III. Hindsdale, Jahn Lecture—1 hour; laboratory—2 hours. Prerequisite: course 5; sound physical condition, and no physical handicap that will 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) II. Hindsdale 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 Advanced Water Safety Instructor Certificate awarded upon successful completion of necessary requirements.)

39. Basic Scuba (2 I, III. Borgwardt Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition and ability to pass preliminary swim 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. (IPNP grading only.)

35A. Dance Composition (2) II. Belden Laboratory—5 hours. Prerequisite: course 1, modern jazz or Baroque dance techniques, or consent of instructor. Composing phases of movement with a knowledge of elements involved in the craft of choreography: design, dynamics, rhythm, emotion and gesture, vocabulary. (IPNP grading only.)

35B. Dance Composition (2) II. Belden Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. To learn the elements of dance production as it applies to the use of lighting, costume design, selection of music, and building of stage sets.

35C. Dance Composition (2) III. Belden Laboratory—5 hours. Prerequisite: courses 35A, 35B, or consent of instructor. To encourage the student to create new dance forms and prepare them for a 15 minute presentation in a spring concert, staged. Costumes and lighting will be created and correlated for each dance by the choreographer.

45A. Health and Physical Education (3) Adams Lecture—3 hours. Study of dance and its relation to culture from the primitive to the Renaissance periods. The development of dance as an art form from the Renaissance period to the twentieth century.


92A. Physical Education Internship (2—6) I, II, III The Staff (Chairperson in charge)

*Course not offered this academic year.*
application to motor performance, including sex differences, success and failure, expectations, anxiety, competition, and aggression.

110. Exercise Metabolism (3) I. 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 and factors which affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise.

111. Environmental Effects on Physical Performance (3) I. Adams
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.

112. Clinical Exercise Physiology (4) III. Holy
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 conditions are examined in detail.

113. Growth and Development in Human Performance (3) I. Adams, Molé
Lecture—3 hours. Prerequisite: Biological Sciences 1A, Cell Biology and Human Anatomy 101, and Psychology 110. 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.

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 muscle-skeletal mechanics, tissue mechanics, electromyographic measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion.

117. Exercise and Aging in Health and Disease (3) II. Holy
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) or 113 (concurrently). Biology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, renal diseases, diabetes, obesity, larynx, etc.). Exercise will then be considered as a protective and therapeutic modality.

118. Physical Fitness in the Workplace (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Explores principles and practices of health promotion in the workplace. Established assessment procedures including validation of job standards are presented. Cost and health benefits are examined with respect to onsite and offsite programs of fitness maintenance and remediation.

120. Sports in American Society (4) I. Gill-Fisher
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.

121. Sports Psychology (4) III. Jennings
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection and methodology through critical examination of relevant experimental, clinical, and field data.

122. Psychological Effects of Physical Activity (3) II. Jennings
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).

125. Neuromuscular and Behavioral Aspects of Motor Control (3) II. Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. Factors which affect control of movement from neurophysiological, psychological, 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.

129A, Research Diving: 65 Feet (1) III. Bergwared
Lecture—1 hour; laboratory—1/2 hour. Prerequisite: basic 3:2:1a scuba certification from approved agency. (course 29 or the equivalent); 10 logged open-water dives since certification; consent of instructor. Lecture in dive theory, navigation techniques and site selection. Control of diving, search and light salvage, night diving, research methods; work performance under water, cold-water diving, swimming, diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (P/N grading only.)

129B, Research Diving: 65 Feet (2) III. Bergwared
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 129A, consent of instructor. Lectures in dive rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, swimming, diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (P/N grading only.)

131. Physical Education for the Handicapped (4) I. Vochterz
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103 and consent of instructor. The role of exercise, physical retraining and remedial work in the improvement of movement for handicapped individuals.

132. First Aid Leadership and Accident Management (3) I, II, III. 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. Administer, narrate supervision of safety, and first aid programs in school and community sports; recreation and safety of groups, regulations, the study and practice of leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

133. Prevention and Care of Sports Injuries (3) I, II, III. 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 in athletic and laboratory on anatomy, emergency care, physical therapy methods, and taping techniques.

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3) I. 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 acute injuries, including repair of ligaments, joint, tendons and muscles. In-depth study of selected current topics in athletic training.

142. Physical Education in the Public Schools (3) II. Piper
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

143A. Coaching Effectiveness (2) I. Singleton
Lecture—2 hours. Prerequisite: consent of instructor. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology to coaching. (P/N grading only.)

143B. Coaching Effectiveness (2) II. Singleton
Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administrative coaching. (P/N grading only.)

145. Administration of Health/Fitness Programs (2) III. Lecture—2 hours. Principles of organizing and directing health/fitness programs, including selection and training of personnel, methods of evaluating personnel and programs, and elements of planning.

146. Theory and Practice of Exercise Testing (1) I, II, III. Jennings
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, muscular and aerobic fitness, exercise session planning, exercise and training sessions for the elderly, andOSH programs for school and community agencies. (P/N grading only.)

146L. Shape-Up Testing and Training Laboratory (1), (2), (3). Jennings
Lecture—discussion—3 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve leading shape-up classes, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (P/N grading only.)

147L. Adult Fitness Training Laboratory (1), (2), (3). Jennings
Laboratory—3 hours. Prerequisites: 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. (P/N grading only.)

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 implications of exercise testing and training and the exercise test. Application of exercise testing and training to healthy and diseased populations. (P/N grading only.)

148L. Adult Fitness Testing Laboratory (1), (2), (3). Holy
Laboratory—3 hours. Prerequisites: courses 146, 146L (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. (P/N grading only.)

149L. Cardiopulmonary Rehabilitation Laboratory (1), (2), (3) I, II, III. Holy
Laboratory—3 hours. Prerequisites: courses 148 and 148L; current CPR certification. Testing and training of cardiology 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. (P/N grading only.)

150. Recreation in the Community (3) III. John
Lecture—discussion—1 hour. Prerequisite: course 101, 102, 112, 146 (may be taken concurrently). Recreation in the community. Selected topics of interest: the nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

152. Physical Education Internship (2-12) I, II, III. The Staff (Chairperson in charge)
Internship—6-36 hours. Written proposal and evaluation. Prerequisite: upper division standing and GPA.
Physical Medicine and Rehabilitation
See Medicine, School of

Physiology

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.N.P. grading only.)

Physical Medicine and Rehabilitation
See Medicine, School of

Physiology

(Contract of Letters and Science)

Barry M. Klein, Ph.D., Chairperson of the Department
Wendell H. Potter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (916-752-1500)

Faculty

Robert H. Becker, Ph.D., Professor
Franklin P. Bracy, Ph.D., Professor
Thomas A. Cahill, Ph.D., Professor
Steven Carpio, Ph.D., Assistant Professor
Daniel A. Cebra, Ph.D., Assistant Professor
Ling-Tie Chau, Ph.D., Professor
Lawrence B. Coleman, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Lorrin R. Conratti, Ph.D., Professor
James E. Draper, Ph.D., Professor
Glen W. Erickson, Ph.D., Professor
Charles T. Faust, Ph.D., Professor
Chung-Yao Fong, Ph.D., Professor
Claude Gurod, Ph.D., Professor
John F. Gurin, Ph.D., Professor
Joseph E. Kitis, Ph.D., Professor
Barry M. Klein, Ph.D., Professor
William T. Ko, Ph.D., Professor
Richard L. Lander, Ph.D., Professor
Sudhindra Mani, Ph.D., Assistant Professor
Douglas W. Mccarty, Ph.D., Associate Professor
David E. Pellet, Ph.D., Professor
Wendell H. Potter, Ph.D., Senior Lecturer
Roderick V. Reid, Jr., Ph.D., Associate Professor
Forest R. Rose, Ph.D., Assistant Professor
Richard T. Scalattar, Ph.D., Assistant Professor
Robert N. Shilton, Ph.D., Professor
Reaj R.P. Singh, Ph.D., Assistant Professor
David J. Webb, Ph.D., Assistant Professor
Philip M. Yager, Ph.D., Professor
Xiangdong Zhu, Ph.D., Assistant Professor
Gergely Zimanyi, Ph.D., Assistant Professor

Emeriti Faculty

James P. Hurley, Ph.D., Professor Emeritus
John A. Jungman, Ph.D., Professor Emeritus
William J. Knox, Ph.D., Professor Emeritus
Neal Peck, Ph.D., Senior Lecturer Emeritus
William W. True, Ph.D., Professor Emeritus

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 B.A. degree provides a broad coverage of classical and modern physics while permitting a

Course offered this academic year.

consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physics Education 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 Physical Education major. (P.N.P. grading only.)

197T. Tutoring in Physical Education (1-5) I, I, II. The Staff (Chairperson in charge) Tutorial—1-5 hours. Prerequisite: consent of instructor. Tutorial students in lower division physical activity courses. Written report on methods and materials required. May be repeated once for credit. (P.N.P. grading only.)

198. Directed Group Study (1-5) I, I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. (P.N.P. grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, I, II. The Staff (Chairperson in charge) Prerequisite: consent of Department Chairperson. (P.N.P. grading only.)

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Moel 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.

200B. Problem Solving and Research Design in Physical Education (2) II. Jennings 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.

201A. Sports Medicine: Medical Aspects of Sports Injuries (2)

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. (Same course as Physiological Medicine and Rehabilitation 201A.)

202. Research Topics in Biomechanics (3) III. K. Williams Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing; course 115 recommended. Survey of current research into diverse areas of biomechanics of human movement. Topics include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, and clinical biomechanics. Offered in alternate years.

203. 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 and its affect on physical performance, and of body structure and compositional changes accompanying prolonged, systematic physical conditioning. Offered in alternate years.

204. Metabolic Functions in Exercise (4) III. Moel Lecture—4 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102, Physiology 114. 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.

205. Physiological Basis of Physical Fitness (2) II.

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research top-
broad, 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.

### Applied Physics B.S. Major Requirements: UNITS

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I &amp; II, 9B, 9C, 9D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 1A, 1B, 2A, 2B, 2C, 2D</td>
<td>22</td>
</tr>
<tr>
<td>Engineering I (or equivalent programming course)</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1A-2B, 2C or 2M-2B/2CH</td>
<td>15</td>
</tr>
</tbody>
</table>

Any recommended courses for a particular concentration.

<table>
<thead>
<tr>
<th>Depth Subject Matter (Common Core)</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I, II, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, 7B, 7C, 7D</td>
<td>86</td>
</tr>
<tr>
<td>Engineering II (or equivalent programming course)</td>
<td>3</td>
</tr>
</tbody>
</table>

At least 18 units from approved courses within one of the following concentrations chosen in consultation with a major adviser: 18

- Materials science
- Physical electronics
- Quantum optics, energy, chemical physics, atmospheric physics
- Geophysics, physical oceanography

(Lists of approved courses in each concentration with representative programs are available from the Physics Department.)

**Total Units for the Major:** 110

### Physics A.B. Major Requirements: UNITS

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I &amp; II, 9B, 9C, 9D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 1A, 1B, 2A, 2B, 2C, 2D</td>
<td>22</td>
</tr>
<tr>
<td>Engineering II (or equivalent programming course)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I, II, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, 7B, 7C, 7D</td>
<td>86</td>
</tr>
<tr>
<td>At least 7 units from Physics 105B, 105C, 105D, 112A, 112B, 12A, 12B</td>
<td>28</td>
</tr>
<tr>
<td>At least 4 additional upper division units in physics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total Units for the Major:** 80

**Recommended** Chemistry 2A-2B, 2C or 2AH-2B/2CH. See also recommended elective courses following the B.S. program below.

**Physics B.S. Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I &amp; II, 9B, 9C, 9D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 1A, 1B, 2A, 2B, 2C, 2D, 2A, 2B, 2C</td>
<td>22</td>
</tr>
<tr>
<td>Engineering I (or equivalent programming course)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I, II, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 5A, 5B, 5C, 5D, 6A, 6B, 6C, 6D, 7A, 7B, 7C, 7D</td>
<td>86</td>
</tr>
<tr>
<td>At least 10 additional upper division units in physics</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total Units for the Major:** 110

**Recommended Electives**

- Astronomy: Physics 2A, 2B, 2C, 2D
- Computer and numerical analysis: Mathematics 128A or 128B
- Engineering: Physics 151A
- Statistics: Statistics 131A
- Physics 10 (history and philosophy of physics)

No credit after any other physics course (except 137, 180).

**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 the Department Undergraduate Majors Office, 231 Physics-Geology Building, for advisor assignment.

### Minor Program Requirements:

- Three distinct minors are offered, all requiring prerequisites equivalent to Mathematics 2A-2B-3C-21D and 2A-2B-2C 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.

<table>
<thead>
<tr>
<th>Physics</th>
<th>18-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical Physics</td>
<td>23</td>
</tr>
</tbody>
</table>


(If the fall quarter courses, 104A, 105A, 11A, 11A, are taken in different years, 104A and 105A should be taken in the first year; course 105B does not require 105A.)

<table>
<thead>
<tr>
<th>Quantum Physics</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Physics 104A-104B and 105A-11A must precede 115A-115B. Physics 113A recommended.)</td>
<td></td>
</tr>
</tbody>
</table>

**General Physics Electives**

| (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, 115B Dept. 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 this major or the minor in astronomy with aeronautical or aerospace technology may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio astronomy or microwave astrophysics.

### Courses in Astronomy (AST)

**Lower Division Courses**

- **2. Introduction to Modern Astronomy and Astrophysics (4),** I. 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, electricity, electromagnetism, 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. 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 physical course (except 10, 137, 160). General education credit: Nature and Environment.

### Courses in Physics (PHY)

Physics I & II is mainly a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Physics I is a two-quarter sequence requiring some mathematics (trigonometry). Either I A 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 II is a three-quarter sequence using some calculus (mostly concepts rather than calculations) and including laboratory work as an integral part. The entire sequence is recommended, rather than just I or 2 quarters.

Physics III is a four-quarter sequence using calculus throughout and including laboratory work as an integral part. The course is designed primarily for students in the physical sciences and engineering.

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. McComb, 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 for credit to students who have completed course 5A or 9A (or former 6A or 6B).

- **1B. Principles of Physics (3),** II. McComb, Lecture—3 hours. Prerequisite: course 1A or 5A (or former 6A); and consent of instructor. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have completed course 5B, 5C, 9B, 9C, or 9D (or former 6B, 6C or 6B, 8C, 8D).

- **5A. General Physics (4),** I. II. The Staff, Lecture—3 hours, laboratory—2 1/2 hours. Prerequisite: Mathematics 31 satisfied concurrently. Mechanics and fluids. Introduction to general principles and analytical methods used in physics. Primar-
96. Honors Modern Physics (4) III. The Staff
Lecture—3 hours; discussion—1–1.5 hours. Prerequisites: course 9HC (or course 9C with recommendation of course 9A instructor or equivalent). Mathematics 22A, 22B, 23A, 23B (may be taken concurrently). Continuation of course 9HC, but in greater depth. Same material as in course 9D but in greater depth. Only 3 units of credit allowed for students who have completed course 9A. Only one unit of credit allowed for students who have completed course 9C.

97. Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2–2.5 hours; discussion—1 hour. Prerequisites: Mathematics 20A. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only two units of credit allowed for students who have completed course 1A. Only one unit of credit allowed for students who have completed course 1B.

98. Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2–2.5 hours; discussion—1 hour. Prerequisites: course 9A or 9C with consent of instructor. Mathematics 21C, 22C, 31B, 32B, 32D (may be taken concurrently). Continuation of course 9B. Electricity and magnetism, modern physics. Only two units of credit allowed for students who have completed course 9B.

99. Special Study for Undergraduates (1–5) I, II. The Staff
Prerequisite: consent of instructor for 1A. Consent of instructor for 1B.

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics (3-3) I-II. Eckron
Lecture—3 hours. Prerequisites: courses 9C, 9D, and Mathematics 210, 220, 22A, 22B passed with grade of C– or better; consent of department required for 104A. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

105A-105B. Analytical Mechanics (3-3) I-II. Ko
Lecture—3 hours. Prerequisites: courses 9C, 9D, and Mathematics 210, 220, 22A, 22B passed with grade of C– or better; consent of department required for 105B. Principles and applications of newtonian mechanics; introduction to Lagrange’s and Hamilton’s equations.

105AL. Computational Laboratory in Mechanics (1) I, Ko
Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the applications of computer to solving physics problems. Introduction to numerical and graphical methods in mechanics. (P/N grading only.)

105BL. Computational Laboratory in Mechanics (1) I, Ko
Laboratory—3 hours. Prerequisite: course 105A; course 105B concurrently. Computer application of numerical and graphical methods in mechanics. (P/N grading only.)

105C. Continuum Mechanics (3) III. Yager
Lecture—3 hours. Prerequisites: courses 104B and 105A passed with a grade of C– or better, or consent of department. Continuum mechanics.

108. Optics (3) III. Culli
Lecture—3 hours; laboratory—2 hours; discussion—1 hour. Prerequisites: course 9HC (or course 9C with recommendation of course 9A instructor or equivalent). Mathematics 21C, 22A (may be taken concurrently). Continuation of course 9HC. Same material as in course 9H, but in greater depth. Only 2 units of credit allowed for students who have completed course 9B.

109. Honors Classical Physics (4) II. The Staff
Lecture—3 hours; laboratory—2–2.5 hours; discussion—1 hour. Prerequisites: course 9H (or course 9C with recommendation of course 9A instructor or equivalent). Mathematics 21C, 22A (may be taken concurrently). Continuation of course 9H. Same material as in course 9C, but in greater depth. Only 2 units of credit allowed for students who have completed course 9C.

110A-110B. Electricity and Magnetism (3-3) II-III. Draper
Lecture—3 hours. Prerequisites: courses 9B, 9C, 9D, and Mathematics 210, 22A, 22B passed with grade of C– or better, or consent of department; pre-

112A-112B. Thermodynamics and Statistical Mechanics (3-3) II, Garrod
Lecture—3 hours. Prerequisites: course 105B or 115A or the equivalent. Introduction to statistical mechanics and thermodynamics.

115A-115B. Introduction to Quantum Mechanics (3-3) II-II. Jungman
Lecture—3 hours. Prerequisite: for 115A—courses 104B and 105B passed with grade of C– or better, or consent of department; for 115B—115A passed with a grade of C– of better, or consent of department. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) II. Pellett
Lecture—3 hours; laboratory—3 hours. Prerequisites: course 9C, Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) II. Pellett
Lecture—3 hours; laboratory—3 hours. Prerequisites: course 9C, Mathematics 22B. Computer-based introduction to the use of digital electronics and microcomputers in experimental physics.

121. Foundations of Atomic and Molecular Physics (4) III. McColm
Lecture—3 hours; outside work—2 hours. Prerequisites: course 9D; Mathematics 21C. The phenomena of atomic physics, introduction to quantum phenomena and quantum mechanics; selected topics dealing with atomic and molecular nuclei, and the solid state.

122A. Advanced Physics Laboratory: Atomic and Solid-State Laboratory—3. interdisciplinary.

122B. Advanced Physics Laboratory: Nuclear and High Energy (3) I, II. Linder
Laboratory—3 hours. Prerequisites: course 9D. Similar to course 122A with experiments a gamma-ray coincidence, monoenergetic electron, muon lifetime, others. Student performs three to six experiments; some of these may be chosen from course 122A.

127. Introduction to Astrophysics (3) III. Becker
Lecture—3 hours. Prerequisite: course 105A. Celestial mechanics, radiation, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology. Offered in alternate years.

129A. Introduction to Nuclear Physics (3) I. Brady
Lecture—3 hours. Prerequisite: course 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics.

129B. Nuclear Physics (4) II. Brady
Lecture—3 hours; outside work—3 hours. Prerequisites: courses 115B, 129A. Continuation of course 129A.

130A-130B. Elementary Particle Physics (3-4) II-III. Rosen

137. Science and Technology of Nuclear Arms: Effects and Control (3) I. Jungerman, Craig
Applied Science.
Lecture—3 hours. Prerequisite: upper division standing; one course from courses 1B, 5C, 9D, 10. Scientific and technical aspects of nuclear arms effects and pre-
nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accoutrement, nuclear reactor operation, nuclear safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Contemporary Societies or Nature and Environment. (Samsel—Science Engineering 137.)

140A. Introduction to Solid State Physics (3) II. Zhu. Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of experimental phenomena in solids. Electrons, phonons, simple metals. 140B. Introduction to Solid State Physics (4) III. Zhu. Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. Discussions of the following: energy bands and Fermi surfaces, transport phenomena, semiconductors, ferromagnetism, magnetic resonance.

160. Environmental Physics and Society (3) I. Jungerman. Lecture—3 hours. Prerequisite: course 9D or SC; or course 10 or 15 and Mathematics 16 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. Prerequisite: course as Engineering 160. General Education credit: Contemporary Societies or Nature and Environment.

194HA-194HB. Special Study for Honors Students (4-4) II. Chau. Chairperson in charge. Independent study—12 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors who satisfy the College 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.)

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 Electrodynamics (4) I. Webb. Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104B, 106B, 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; central moments; Legendre transform; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations.

200B-200C. Theory of Mechanics and Electrodynamics (4-4) II-III. Webb. Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electrodynamics including static electromagnetic fields; Maxwell’s equations; waves in various media; magnetohydrodynamics; diffusion theory; radiating systems; and special relativity.

204A-204B. Methods of Mathematical Physics (4-4) II. Chau. 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.

215A-215B-215C. Quantum Mechanics (4-4-4) II-III. Reid. Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development of quantum mechanics. Approximation 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) II. Singh. 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 and liquids, fluctuations about the equilibrium state, and phase transitions and critical phenomena.

221. Atomic Physics (3) III. McColm. Lecture—3 hours; seminars—1-2 hours. Prerequisite: course 215B. 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; consult department. 222A. Group Theoretical Methods of Physics—Condensed Matter (3) III. Garrod. Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is co-requisite) or consent of instructor. Theory of groups and their representations with applications in condensed matter.

222B. Group Theoretical Methods of Physics—Elementary Particles (3) III. Kiskis. Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is co-requisite) or consent of instructor. Theory of groups and their representations with applications in elementary particle physics.

224A. Nuclear Physics (3) II. Draper. Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleus-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics.

224B. Nuclear Physics (3) III. Draper. Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static moments, and electromagnetic transition rates.

224C. Nuclear Physics (3). Draper, Bray. Lecture—3 hours. Prerequisite: course 224A. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions.

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) II. 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. Gurion. Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of perturbation theory; Feynman diagrams; renormalization.

230B. Quantum Theory of Fields (3) II. Carlip. Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.
Physiological Sciences

(School of Veterinary Medicine)
Richard A. Freedland, Ph.D., Chairperson of the Department
Department Office, 1094 Haring Hall (916-752-1373)

Faculty
Michael L. Bruss, D.V.M., Ph.D., Professor
Donald L. Curry, Ph.D., Professor
Dorothy W. Gietzen, Ph.D., Assistant Professor
Robert J. Hansen, Ph.D., Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
James H. Jones, Ph.D., D.V.M., Associate Professor
James G. Morris, Ph.D., Professor
Quinton R. Rogers, Ph.D., Professor

Emeriti Faculty
Arthur L. Black, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Victor W. Burns, Ph.D., Professor Emeritus
Charles E. Cornelius, D.V.M., Ph.D., Professor Emeritus
Richard A. Freedland, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Alfred R. Heusner, Docteur-es-Sciences, Professor Emeritus

Courses in Physiological Sciences (PHC)

Lower Division Course
92. Internship (1-12) I, II, III. Freedland Internship—1-12 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Physiological Sciences. Internships supervised by a member of the faculty. (S/U grading only.)

Upper Division Courses
192. Internship (1-12) I, II, III, summer. Freedland Internship—1-12 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 Physiological Sciences. Internships supervised by a member of the faculty. (S/U grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Graduate Courses
205A. Intermediary Metabolism of Animals (4) I. Freedland, Baldwin (Animal Science); Schneeman (Nutrition) Lecture—4 hours. Prerequisite: course 205A or consent of instructor. (S/U grading only.)

205B. Intermediary Metabolism of Animals (3) II. Rogers, Hansen, Hershey (Biochemical Chemistry), Tucker (Nutrition) Lecture—4 hours. Prerequisite: course 205A or consent of instructor. (S/U grading only.)

220. Physiology of the Liver (3) I. Bruss Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: system physiology; biochemistry or physiological chemistry; or consent of instructor. 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; ion transport; and function tests.

225. Comparative Neuronal Function in Domestic Animals (2) II. Gietzen Lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 1B or the equivalent, and Psychology 108 or Veterinary Medicine 421 or the equivalent. Basic function of several neural systems will be described, using a general model. Discussion will cover species differences for each system. Mammals, birds, and amphibians that are commonly kept as companion or production animals will be compared. (Same course as 225.)

230. The Secretory Process (2) II. Curry 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 a role model. Offered in alternate years.

235. Behavioral Adaptations to Parasites and Pathogens (3) III. Haas Lecture—2 hours; term paper/discussion—1 hour. Prerequisite: Veterinary Medicine 406; or graduate standing and upper division course in animal behavior; or consent of instructor. Examination of the ways in which animals use behavioral strategies to avoid debilitating viral, bacterial and parasitic diseases, or to overcome such diseases once they are sick. Main emphasis is on vertebrates, especially wild and domestic mammals.

243A. Isotopes as Tracers in Biological Research (2) I. Bruss Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry; elementary calculus and physics; or consent of instructor. Study of the properties of isotopes and their detection with emphasis on biological applications. Offered in alternate years.

243B. Isotopes as Tracers in Biological Research (2) II. Bruss Lecture—18 hours total; laboratory—2 hours total. Prerequisite: course 243A or consent of instructor. Study of in vivo and in vitro techniques for using isotopes in biological research. Offered in alternate years.

280. Structure and Function of the Mammalian Respiratory System (4) I. Jones Lecture—3 hours; discussion—1 hour. Prerequisite: Biochemistry 101A; 101B, Mathematics 16A; 16B; and 16C, Physics 5A and 5B. Advanced study of respiratory physiology and morphology with emphasis on principles of alveolus, ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. 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 system physiology (e.g., Animal Physiology 110), Biochemistry (e.g., Biological Sciences 102 and 103) or physiological chemistry (e.g., Physiological Chemistry 101A and 101B) or equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Professional Course
427. Tutoring in Physiological Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. 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. (S/U grading only.)

425. Comparative Neuronal Function in Domestic Animals (2) II. Gietzen Lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 1B or the equivalent, and Psychology 108 or Veterinary Medicine 421 or the equivalent. Basic function of several neural systems will be described, using a general model. Discussion will cover species differences for each system. Mammals, birds, and amphibians that are commonly kept as companion or production animals will be compared. (Same course as 225.)
Physiology

See Biological Sciences: Section of Neurobiology, Physiology and Behavior

Course in Physiology (PHS)

Questions pertaining to the following course should be directed to Biological Sciences: Section of Neurobiology, Physiology and Behavior.

Upper Division Course

100A. Cellular Physiology (3) I. Horowitz Lecture—3 hours. Prerequisite: Biological Sciences 1A, Chemistry 85. Interaction of intracellular compartments in the functioning of animal cells. The metabolic bases and regulation of cellular function. Relation of cell and tissue structure to physiological mechanisms. Last offering: fall quarter 1993. This course will be canceled and replaced by Biological Sciences 104.

Physiology (A Graduate Group)

Charles A. Fuller, Ph.D., Chairperson of the Group Office, 196 Briggs Hall (916-752-9696)

Faculty. Consists of more than 70 faculty members drawn from 23 departments in the College of Agriculture and Environmental Sciences, the College of Letters and Science, 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. and M.D. programs. The programs emphasize broad training in the fundamental principles of physiology and in-depth specialization in cardiorespiratory, cellular, comparative, endocrine, reproductive, exercise, metabolic, neuro-, systemic and domestic animal physiology. For information regarding these programs, address the Program Staff Person at the above location.

Graduate Advisers. J. M. Horowitz (Neurobiology, Physiology and Behavior), J. H. Jones (Physiological Sciences), and R. Adams (Animal Science).

Graduate Admissions Officer. T. Adams (Animal Science).

Courses in Physiology (PGG)

Graduate Courses

200L. Animal Cell Culture Laboratory (4) II. B. Wilson 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 emphasis on cell physiology and the actions of drugs and toxins on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.

210A-210B-210C. Advanced Physiology (5-6-6) I- II-III. Jones Lecture—5 hours; 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) II. II. Horowitz, Sobceby 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 gate; computer interfacing; and programming.

214. Neurophysiology (4) II. Carstens Lecture—4 hours. Prerequisite: Neurobiology, Physiology and Behavior 1115, 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, Sobceby Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

216. Neurophysiology Literature (2) I. Pappone Lecture—1 hour; discussion—1 hour. Lectures covering experimental and theoretical studies in mammals. Cell membrane ion channels and the resulting characterization of the physiological functions and structure/ function relationships of some of the most important neural fiber types. Discussion of classical and current original papers.

217. The Vertebrate Eye (2) II. Silman Seminar—1 hour; lecture/discussion—1 hour. Prerequisite: graduate standing and a background in biology; Neurobiology, Physiology and Behavior 120; 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. Carlson (Human Physiology) Lecture—2 hours; discussion—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; cell biology, biochemistry, neural control mechanisms, circulation 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 variety 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. Prerequisites: Neurobiology, Physiology and Behavior 121 or equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Emphasis on modern research drawn from these results, and their contribution to our understanding will be discussed.

230. Advanced Endocrinology (2) II. Mober 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) III. Wooley Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent course in systemic neurobiology; Neurobiology, Physiology and Behavior 130 or the equivalent course in endocrinology. Neuro-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) III. Wooley Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic levels 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 Environ. Mgmt. 221).

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 occurrence of rhythm desynchronizations 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. 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. (SU 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. (SU grading only.)

291A. Selected Topics in Visual Science (2) III. Charlapa (Psychology, Johnson (Ophthalmology), Sobceby (Neurology), Silman 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. (SU grading only.)

291B. Seminar in Cellular Mechanisms of Adaptation (1) I, II, III. Horowitz 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 a different topic is studied. (SU 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 instruc- tor. Current research in physiology. Overall design of experiments and particular research areas. (SU grading only.)
Plant Biology

See Plant Biology (below); Division of Biological Sciences: Section of Plant Biology; and Plant Biology (A Graduate Group)

Plant Biology

(College of Agricultural and Environmental Sciences)
Robert W. Peary, Ph.D., Chairperson of the Section

Committee in Charge
Kent J. Bradford, Ph.D. (Vegetable Crops)
John J. Harada, Ph.D. (Plant Biology)
Terence M. Murphy, Ph.D. (Plant Biology)
Carolyn M. Bell, Ph.D. (Environmental Horticulture)
Robert M. Thornton, Ph.D. (Plant Biology)
John Yoder, Ph.D. (Vegetable Crops)

A.B. Major Requirements:

Preparatory Subject Matter

Biological Sciences 1A-1B-1C

Chemistry 2A-2B-2C

Mathematics 16A-16B-16C

Physics 5A-5B-5C

Agricultural Science and Management 150 or Statistics 13, 32, 100, or 102

Depth Subject Matter

Biological Sciences 101 or Plant Science 102

Chemistry 101 or Plant Science 103

Plant Biology 102, 103, 104, 105, 106

Completion of one area of Emphasis listed below

Course not offered this academic year.

Agricultural Science and Management 150 or Statistics 13 or 100 or 102

Depth Subject Matter

Biological Sciences 101

Plant Biology 102 or 103

Evolution and Ecology 140 or Plant Biology 116

Plant Biology 105, 111, 112, 117

Additional upper division units in Plant Biology or related natural science courses

Total Units for the Major

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.) contact the chairperson, including courses in other sections or departments, may be allowed on prior consultation with a Plant Biology major advisor.

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 1A-1B-1C

Chemistry 2A-2B-2C

Mathematics 16A-16B-16C

Physics 5A-5B-5C

Agricultural Science and Management 150 or Statistics 13, 32, 100, or 102

Depth Subject Matter

Biological Sciences 101 or Plant Science 102

Biological Sciences 102, 103, 104, 105, 106

Completion of one of Area of Emphasis listed below

Course not offered this academic year.

(1) Applied plant biology

Plant Biology 112

Plant Science 101 or 103

Plant Science 140

Molecular and Cellular Biology 120L

Plant Biology 111L; Plant Science 107L, 112L, 140L; or Vegetable Crops 191L

Additional upper division coursework from the Applied Plant Biology emphasis area course list to achieve a total of 24 or more units (Plant Science 145 recommended)

(2) Plant evolution and ecology

Evolution and Ecology 100

Plant Biology 117 or Plant Science 101

One course from the Applied Plant Biology emphasis area course list (Plant Science 145 recommended)

Additional upper division coursework from the Plant Ecology and/or Plant Evolution and Diversity emphasis area course list to achieve a total of 24 or more units

(3) General plant biology:

Evolution and Ecology 100, Plant Biology 112

Plant Biology 117 or Plant Science 101

One course from the Applied Plant Biology emphasis area course list (Plant Science 145 recommended)

One course from the Evolution and Diversity emphasis area course list

A.B. Major Requirements:

Preparatory Subject Matter

Biological Sciences 1A-1B-1C

Chemistry 2A-2B, 8A-8B

Units

35

16

*Course not offered this academic year.
Additional upper division coursework from any of the four emphasis area course lists, chosen in consultation with an adviser, to achieve a total of 24 or more units.

(4) Plant physiology, development and molecular biology.

Plant Biology 112........................ 3
Molecular and Cellular Biology 120L, 170L; Plant Biology 111L or Plant Science 107L.

One course from the Plant Biology emphasis area course list (Plant Science 145 recommended)................. 3-5
One course from the Plant Biology emphasis area course list................................................. 3-4
One course from the Plant Evolution and Diversity emphasis area course list........................... 3-5

Additional upper division coursework from the Plant Physiology, Development, and Molecular Biology emphasis area course list to achieve a total of 24 or more units................................................................. 3-9

Emphasis Area Course Lists

Applied Plant Biology emphasis area: Agronomy 100, 100L, 112, Atmospheric Science 105; Entomology 100, 100L, 110, 115, 118, 119, 135; Environmental Horticulture 105, 107, 120, 125, 130, 133; Environmental Horticulture 101; International Agricultural Development 101; Nematology 110, 111; Plant Pathology 120, 121, 122, 150; Plant Pathology 120, 123, 130; Plant Science 101, 102, 103, 105, 107L, 109, 112, 113, 122, 123, 135, 140, 196; Pomology 101, 102, 103, 107, 170; Range Science 105, 109, 133; Soil Science 100, 105, 109, 111; Vegetable Crops 101, 105, 118, 150, 191, 191L; Viticulture and Enology 101, 105, 110, 115, 118, 118L; Water Science 100, 104.

Ecology emphasis area: Agronomy 112; Entomology 120; Environmental and Resource Sciences 100; Environmental Studies 100, 101, 122, 123, 124, 128, 131, 150C, 151, 151L; Evolution and Ecology 138; Plant Biology 101, 117; Plant Science 101; Range Science 133, 134; Water Science 100, 104, 122, 123L.

Evolution and Diversity emphasis area: Evolution and Ecology 100, 102, 106, 140, 144, 149; Plant Biology 102, 105, 106, 118, 119, Plant Science 103; Vegetable Crops 105.

Plant Physiology, Development, and Molecular Biology emphasis area: Agronomy 120; Environmental Horticulture 133; Molecular and Cellular Biology 125; Plant Biology 125, 135; Plant Pathology 110; Plant Science 102, 105, 107L, 122, 127, 128, 140.

Total Units for the Major................................................. 105-106

Master Adviser. Contact the Plant Biology Section Office, 143 Roberts Hall.

Minor Program Requirements:

Plant Biology.............................. 23

To satisfy the requirements for a Plant Biology minor, a student must complete Biological Sciences 1C (or equivalent introductory plant biology course)................................. 5
Upper division units including at least one course from the four groups below................................. 18
(a) Structural botany; Biological Sciences 104; Plant Biology 105, 116, 119;
(b) Physiological botany; Plant Biology 111, 112, Plant Science 102;
(c) Ecological botany; Evolution and Ecology 144, 149, Plant Biology 101, 117;
(d) Systematics and evolution; Evolution and Ecology 140, Plant Biology 102, 116, 119, 119.

Plant Biology 116, 118, and 119 may be offered toward satisfaction of either group (a) or (d) above. However, a single course may not satisfy the requirements for both groups.

Minor Adviser. Suggested as 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 honors and highest honors at graduation are not dependent on completion of 194H. Refer to the Academic Information section and the appropriate College section for Dean's Honors List Information.

Teaching Credential Subject Representative. R. M. Thornton (Secretary of Plant Biology), 219 Robbins Hall. See also the Teacher Education Program.

Graduate Study. Graduate programs leading to M.S. and Ph.D. degrees are offered in cytology, plant physiology, plant molecular biology, anatomy, morphology, taxonomy, ecology, mycology, physiology, and allied areas. The resources of the sections are augmented by appropriate courses in related departments.

Courses in Plant Biology (PLB)

(formerly courses in Botany)

Lower Division Courses

10. Plants, People 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. Non-science majors are encouraged to enroll. General Education credit: Nature and Environment.

92. Internship (1-12) I, II. The Staff (Chairperson in charge) Internship—3-6 hours. Prerequisite: consent of instructor. Technical and/or professional experience on off-campus. Supervised by a member of the Plant Biology Department faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor. For primarily lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Survey of Plant Communities of California (4) II. Barbour Lecture—2 hours; fieldwork—1 hour; term paper. Prerequisite: consent of instructor required. Biological Sciences 1C recommended. Structure of selected plant communities and the relationship of their component species to the environment. Recommended for non-majors. General Education credit: Nature and Environment.

102. California Floristics (5) III. The Staff 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 plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora.


106. Systematic Botany of Flowering Plants (5) III. The Staff Lecture—3 hours; laboratory—6 hours. Prerequisites: Biological Sciences 1A, 1B, 1C; laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys.

111. Plant Physiology (3) I. Lucas; III. Stemler Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B may be taken concurrently; Physics 5A, 5B, 5C 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.

110D. Problems in Plant Physiology (1) I. Lucas; III. 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 class period. (P/NP grading only.)

111L. Introductory Plant Physiology Laboratory (3) III. Bonner Discussion—1 hour; laboratory—6 hours. Prerequisite: course 111 may be taken concurrently. Introduction to basic experimental techniques and instrumentation used in the investigation of plant physiological processes such as water-solute absorption and movement and utilization; translocation; transpiration; photosynthesis; respiration; growth; development and reproduction.

112. Plant Growth and Development (3) II. Thornton Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B; course 111 and Biological Sciences 102 recommended. Processes, dynamics, and control of growth and development. Metabolism.

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.)

116. Plant Development and Evolution (4) II. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory plant biology (i.e., Biological Sciences 1C). Introduction to form, development and evolution of vascular plants. Emphasis is given to the development of reproductive structures in ferns and seedproducing plants as a basis for determining evolutionary relationships. Structure-function relationships are also considered with regard to changing environments.

141. Plant Ecology (4) I. Stanton, Peary, Barbour Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; course 112 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 course 101. (Same course as Evolution and Ecology 117).

118. Introduction to Phycology (4) II. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Comparative morphology, physiology, development and reproduction of the major algal groups, including cyanobacteria. Focus is on phylogeny through serial eukaryotic laboratory studies living organisms and have identification exercises. Ecological factors and commercial uses are considered.

119. Introductory Mycology (5) I. The Staff Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to structure, oogamy, and taxonomy of selected species of the major divisions of the fungi.

120. Introduction to Weed Science (3) II. Bayer Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B.

*Course not offered this academic year.
Principles of weed science including mechanical, biological, and chemical control methods. Weed growth in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Sighting identification of common weeds and demonstrations to illustrate the principles.

121. Biology of Weeds
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, life history, 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.

122. Action of Herbicides (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120; Soil Science 100; courses 111, 111D recommended. Influence on 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.

125. Molecular Biology of Plant Development (3) III. Murphy
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Biological Sciences 103, Molecular and Cellular Biology 161 or course 111. Gene expression and regulatory mechanisms influencing growth and differentiation of higher plants.

138. Mineral Nutrition of Plants (4) III. J. Richards
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. Plant nutrition. Photosynthesis, nutrient utilization, development, (growth and differentiation of higher plants.

150. Biology and Management of Freshwater Macrophytes (3) I. Anderson
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Principles in water quality management. Laboratory methods in preparing biological materials for examination. Practical field techniques in the identification and collection of aquatic plants. (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. Research projects supervised 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 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 of the staff. Completion will involve the writing of a senior thesis. (P(NP grading only.)

197T. Tutoring in Botany (1-5) I, II, III. The Staff
Lecture—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Limited student will participate in a laboratory project. (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)
Prerequisite: consent of instructor. (P(NP grading only.)

---

### Plant Biology (A Graduate Group)

Judy Jernefeldt, Ph.D., Chairperson of the Group

**Faculty**
Includes 100 faculty members from fifteen 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 is designed to prepare students for careers in research and teaching at colleges and universities, government or industrial laboratories.

**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 biology, genetics, structural biology, biochemistry, and study of advanced biology. 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

  - Lecture—4 hours. Prerequisite: Plant Biology 111, 112, Botany and Biology 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)** Stich (Environmental Horticulture), Labavich (Pomology).
  - Lecture—1 hour; discussion—1 hour. Prerequisite: Plant Science 101 and Plant Biology 111, 112. Selected physiological topics currently focusing on source-sink behavior affecting crop production and quality. Offered in alternate years. (P(NP grading only.)

- **203A. Advanced Plant Physiology (3)** III. Lucas
  - Lecture—3 hours. Prerequisite: Plant Biology 112, Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, translocation and membrane transport.

- **203B. Advanced Plant Physiology (3)** II. Trela, Trela
  - Lecture-discussion—3 hours. Prerequisite: Plant Biology 111, 112, and Biological Sciences 103. Photosynthesis, photophosphorylation, chloroplast metabolism and biochemistry.

- **203C. Advanced Plant Physiology (3)** I. The Staff
  - Lecture—3 hours. Prerequisite: Plant Biology 112, Biological Sciences 102; courses 205A, 205B and Biological Sciences 103 recommended. Internal and environmental regulation of plant growth and development.

- **206A. Advanced Plant Physiology Laboratory (3)** III. Lucas
  - Laboratory—6 hours; term paper. Prerequisite: course 205A may be taken concurrently. Laboratory procedure in plant physiology. Experiments describe the theory and practice of modern instrumentation, and are designed to illustrate subject material of course 205A.

- **206B. Advanced Plant Physiology Laboratory (3)** Laboratory—9 hours. Prerequisite: course 205B may be taken concurrently. Laboratory procedures in plant physiology. Experiments designed 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 (3)** II.
  - Labavich (Pomology), Yang (Vegetables, Crops)
  - Lecture—3 hours. Prerequisite: Plant Biology 112, Chemistry, biochemistry and physiological activity of major classes of plant growth regulators. Primary consideration given to concepts that are of current research interest. Uses of growth regulators in agriculture. Offered in alternate years.

- **210. Plant Ecophysiology (3)** I. Peavy
  - 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)** I. Peavy
  - 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 Herbaceous Plant (3)** II. Bayer
  - Lecture—3 hours. Prerequisite: Plant Biology 112, 117. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants.

- **214. Higher Plant Cell Walls (3)** I. Labavich (Pomology), Nave (Vegetable, Crops)
  - Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112, 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 59; Mechanisms and phenomena

---

*Course not offered this academic year.*
involved in the control of plant growth by light. Pho
togeny, cytokinogeny, photoperiodism, and
other aspects of phyllosynthesis. Course offered in
alternate years.

22.16. Advanced Topics in Mineral Nutrition (4) III.
Lachin (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite:
Plant Biology 135 or consent of instructor. Cellular
compartmentation of mineral elements, new methods
and results; selected topics in abscission, transloca
tion, and function of mineral elements; nutrition
and transport in plants adapted to special nutri
tant environments. Offered in alternate years.

22.17. Membrane Biology of Plants (3) III. Bennett
(vegetable Crops)
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 physiologi
cal processes. Offered in alternate years.

22.18A. Advanced Concepts in Plant Cell Biology: Cell
Biogenesis (3) III. Bennett, Brehm
Lecture—2 hours; discussion—1 hour. Prerequisite:
Biological Sciences 102, 103. Summary of cellular
mechanisms underlying structural and functional
differentiation of plant cell subcellular compartments. Topics include membrane and protein biogenesis, protein target
ing, turnover and regulation of nuclear and organelle gene expression as related to the biogene
sis of plant cell organelles. Offered in alternate years.

22.19. Plant Developmental Biology (4) III. Rost,
Jennelle, Silk
Lecture—3 hours; discussion—1 hour; term paper.
Prerequisite: Plant anatomy, physiology, and bio
chemistry. A survey of the concepts of plant develop
tment and organization. Examines plant cells, tissues, and organs with emphasis on experimental evidence for mechanisms regulating developmental processes.

22.21. Special Topics in Plant Physiology (2) III.
The Staff
Discussion—1 hour; seminar—1 hour. Analysis in
depth of recent advances in plant physiology. Lectures
and discussions by research specialists. Term paper
integrating and analyzing lectures required. May be repeated for credit. (SU grading only.)

22.22. Special Topics in Plant Morphology, Sys
tematics, and Ecology (2) II. The Staff
Seminar—2 hours. Analysis of recent advances in
plant structure and evolution. Lectures and discus
sions by research specialists. Term paper integrating
and analyzing lectures required. May be repeated once
for credit. (SU grading only.) Offered in alternate years.

22.27. Plant Molecular Biology (4) II. Harada
Lecture/discussion—4 hours. Prerequisite: Molecular
and Cellular Biology 121 or 161. Molecular aspects
of higher plant biology with emphasis on gene expres
sion, plant nuclear and organelle genome organiza
tion, gene structure, mechanisms of gene regulation,
gene transfer, and special topics related to develop
ment and response to biological and environmental stimul.

22.28. Plant Molecular Biology Laboratory (5) II.
Harada, Bennett (vegetable Crops)
Lecture—2 hours; laboratory—10 hours. Prerequisite:
Molecular and Cellular Biology 120L, a course in mol
ecular 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 Vegetable Crops 228.)

22.29. Molecular Biology of Plant Reproduction (3)
II. O'Neill
Lecture—3 hours. Molecular genetic basis of plant
reproduction. Emphasis on understanding developmen
tally regulated expression of genes related to
major changes occurring during plant reproduction
and on the genetic control of flowering. Offered in
alternate years.

22.30. 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.

23.1. Biological Electron Microscopy Laboratory
(1) I. Falk
Laboratory—9 hours. Prerequisite: consent of instruc
tor, course 231 (may be taken concurrently). Intro
duction to biological electron microscopy. Areas covered are: specimen preparation and microscopy
operation. Limited enrollment.

22.35. Principles of Plant Taxonomy (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite:
Plant Biology 108; Evolution and Ecology 100 recom
mended. Principles of plant taxonomy; phylogenetic
vs. phyletic classification; examples of the way in
which various disciplines—anatomy, embryology, bio
chemistry, etc.—elucidate problems of taxonomic
relationship, mainly of genera and higher categories.

22.56A. 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 experi
mental techniques to the elucidation of taxonomic
problems and evolutionary relationships in higher
plants. Offered in alternate years.

22.56B. Experimental Plant Taxonomy (3) II. Kyhos
Lecture—1 hour; laboratory—5 hours. Prerequisite:
course 256A. Continuation of course 256A. Study of
variation in natural populations in relation to taxon
omy; the application of population sample analysis, cyto
genetics, plant systematics, etc., to the solution of
taxonomic problems and the clarification of relations
ships. Offered in alternate years.

22.90A. 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.

22.90B. Seminar (1, 2, III. The Staff
Seminars presented by visiting scientists on research
topics of current interest. (SU grading only.)

22.90C. Research Conference in Botany (1) I, II, III.
Discussion—1 hour. Prerequisite: graduate standing
and/or consent of instructor. Presentation and dis
cussion by faculty and graduate student researchers of projects in botany. May be repeated for credit. (SU grading only.)

22.91. Graduate Student Seminar in Plant Biology
(1) I, 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. Topics determined by instructor
in charge. May be repeated for credit. (SU grading only.)

22.95. Seminar in Mycology (1) I. Butler (Plant Patholog
y)
Seminar—1 hour. Review and evaluation of current
literature and research in mycology. (SU grading only.) (Same course as Plant Pathology 295.)

22.97. Tutoring in Plant Biology (1-5) I, II, III. The Staff
Tutoral—3—15 hours. Offers graduate students, par
ticularly those not serving as teaching assistants, the
opportunity to gain teaching experience. (SU grading only.)

22.99. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor.

22.99. Research (1-12) I, II, III. The Staff
Prerequisite: graduate standing. (SU grading only.)

Professional Course

23.00. The Teaching of Plant Biology (2) I, II, III. The Staff
Discussion—2 hours. Prerequisite: graduate standing;
continuing 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.
(SU grading only.)
Plant Physiology (A Graduate Group)

Students admitted into the Plant Physiology Graduate Group before June 30, 1971, will be allowed to complete their degrees in this subject. New students, however, should see the Plant Biology Graduate Group section in this catalog.

Information. 152 Robbins Hall (916-752-7046)

Plant Protection and Pest Management (A Graduate Group)

Les Ehler, Ph.D., Chairperson of the Group

Office. 367 Briggs Hall (916-752-0475)

Faculty. Includes faculty members from the Colleges of Agricultural and Environmental Sciences, and Life and Earth 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 pests 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. J. Granett (Entomology), R.T. Norris (Botany)

Courses in Plant Protection and Pest Management (PPP)

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (A) (4) I. Marses (Plant Pathology) Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Agricultural Science and Management 150, Entomology 110, Plant Pathology 120.Botany 120 may be taken concurrently. Nematology 110, Botany 117 or Zoology 125 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. Nois (Botany), I. Rosenheim (Entomology) Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Botany 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.

204. Seminar (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Plant Protection and Pest Management (A Graduate Group)

See Biological Sciences: Section of Plant Biology; Plant Biology; and Plant Biology (A Graduate Group)

*Course not offered this academic year.

Plant Physiology (A Graduate Group)

Students admitted into the Plant Physiology Graduate Group before June 30, 1971, will be allowed to complete their degrees in this subject. New students, however, should see the Plant Biology Graduate Group section in this catalog.

Information. 152 Robbins Hall (916-752-7046)
Select one of the following eight options: 38-49

Agronomy Option
Specific course requirements: 20-21
Agronomy 103, 104 5
Agronomy 111, 112, 113 (any two courses) 7-8
Plant Science 101 4
Soil Science 109 4

Additional courses to be selected with consent of the adviser from the following:
Agricultural Economics 130, 140, 150
Agricultural Science 24-25
Environmental Science 110, 111, 113, Soil Science 102, 120, 150.
Plant Science 102, 103, 110, 112, 117.
Courses offered in other programs and departments (e.g., Vegetable Crops, Horticulture, Entomology, etc.)
may be selected with consent of the adviser to satisfy specific individual goals.

Fioriculture/Nursery Management Option
Specific course requirements: 27
Environmental Horticulture 6, 105, 120, 125, 133 19
Plant Science 102, 109 8

Additional courses to be selected with consent of the adviser from the following:
Cultural Economics 19, 112, 113
Athletic Economics 19, 112, 113
Agricultural Engineering Technology 103, Horticulture 105, 111L
Agricultural Science 110, 111, 113, Soil Science 102, 112, 117.
Courses offered in other programs and departments (e.g., Vegetable Crops, Horticulture, Entomology, etc.)
may be selected in consultation with the adviser to satisfy specific individual goals.

Landscaping Horticulture Option
Specific course requirements: 30
Environmental Horticulture 6, 105, 120, 130, 133 17
Landscape Architecture 40, 131, 135-9
Plant Science 102 4

Additional courses to be selected with consent of the adviser from the following:
Agricultural Economics 19, 112, 113
Agricultural Engineering Technology 103, Horticulture 105, 111L
Agricultural Science 110, 111, 113, Soil Science 102, 112, 117.
Courses offered in other programs and departments (e.g., Vegetable Crops, Horticulture, Entomology, etc.)
may be selected in consultation with the adviser to satisfy specific individual goals.

Plant Pathology Option
Specific course requirements: 40
Biochemistry 101A, 101B 6
Plant Pathology 101, 102, 103, 104 10
Chemistry 1C, 5 9
Microbiology 2, 3, 4
Soil Science 109 4

Additional courses to be selected with consent of the adviser from the following:
Agricultural Economics 19, 112, 113
Agricultural Science 24-25
Environmental Science 110, 111, 113, Soil Science 102, 120, 150.
Plant Science 102, 103, 110, 112, 117.
Courses offered in other programs and departments (e.g., Vegetable Crops, Horticulture, Entomology, etc.)
may be selected in consultation with the adviser to satisfy specific individual goals.

Unrestricted Electives 0-30
Total Units for the Major: 180

Major Adviser: R. Dalmiers.
Plant Science

Advising Center for the major is located in 137 Hunt Hall (912-528-1715).

Related Courses. See under Agronomy, Environmental Horticulture, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

Courses in Plant Science (PLS)

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center (see above).

Lower Division Courses
10. Plants and People (3) I. Bradford (Vegetable Crops); II. Bennett, Michelmore, III. Nevin
Lecture—3 hours. Prerequisite: high school biology. Plants as food, feed, fiber, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect utility. General Education credit: Nature and Environment.

Internship—3-18 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to plant science. Internships supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-6) I, II, III. The Staff (Agronomy and Range Science) in charge.
Prerequisite: lower division standing. (P/NP grading only.)

Upper Division Courses

101. Ecology of Crop Systems (4) II. Bloom (Vegetable Crops)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and Soil Science 100, 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.

102. Physiology of Cultivated Plants (4) III. Sachs (Environmental Horticulture)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and Botany 112. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

103. Evolution of Crop Plants (3) II. Jaim (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: course 10. Genetics 100. Concepts and development of the most significant major line of cultivated plants and the impact of the environment on development of plants. Offered in alternate years.

104. Conservation of Plant Genetic Resources (4) I. Bliss (Pomology)
Lecture—3 hours; discussion—1 hour. Prerequisite: Genetics 10 or Biological Sciences 10. Biological, social, and ethical issues involved in plant genetic resources will be studied beginning with their historical importance to human welfare and covering germplasm utilization, property rights and strategies for conservation, both on an international and a personal scale. General Education credit: Nature and Environment.

105. Genetics (4) I. Wilkins
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A. Application of basic principles in transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics to plant reproduction. Practical aspects of genetic crosses and analysis of segregating populations.

107. Plant Cell, Tissue, and Organ Culture (4) II. Burger (Environmental Horticulture), Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 111, 112 (may be taken concurrently); or consent of instructors. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryo genesis, anther culture, protoplast culture and transformation. Offered in alternate years.

109. Plant Propagation (4) II. Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects.

110. Rhizosphere Ecology (2) III. Phillips
Lecture—2 hours. Prerequisite: course 2 or Biological Sciences 1A-1B-1C. Plant-soil interactions affect plant growth, soil formation, and agricultural sustainability. Course addresses physical, chemical and biological processes which occur at the surface of plant roots. Evolution and modification of the biochemical and genetic bases of rhizosphere ecology are discussed.

112. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology)
Reid (Environmental Horticulture), Salvet (Vegetable Crops)
Lecture—3 hours. Prerequisite: general plant science background required (e.g. course 2, or Food Science and Technology 2), concurrent enrollment in course 112L 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.

112L. Postharvest Physiology and Handling Laboratory (2) I. Kader, Salvet
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112.

113. Plant Breeding (4) II. St. Clair (Vegetable Crops)
Lecture—3 hours; demonstration-discussion—2-3 hours. Prerequisite: Genetics 100 (may be taken concurrently). The principles of plant breeding applied to economic crops.

122. Physiological Genetics of Crop Plants (3) I. Jones (Vegetable Crops)
Lecture—3 hours. Prerequisite: Genetics 100; Botany 111, 112; or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels; genetic control, biochemical and physiological relationships, and the impact of the environment on development of plants. Offered in alternate years.

128. Physiology of Environmental Stress in Plants (3) II. Lauth (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112 (may be taken concurrently) or the equivalent. Principles and recent advances in the physiology of environmental stress in plants. Genes and their interactions with the environment are the major focus. Offered in alternate years.

135. Mineral Nutrition of Plants (4) II. Richards (Land, Air, and Water Resources), Brown (Pomology)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 111 or the equivalent. Evolution and scope of plant nutrition, essential and non-essential elements, mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition.

140. Principles of Plant Biotechnology (3) II. Denudek (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1A and Genetics 100. Principles and concepts of plant biotechnology including recombinant DNA techniques, prenatal and disease control, plant cell and tissue culture, and crop improvement.

145. Applied Plant Biology (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 111, and Genetics 100 or course 105. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and environmental enhancement. Current topics include photosynthesis, and issues in crop improvement, postharvest physiology and biotechnology will be presented and discussed.

192. Internship (1-12) I, II, III, summer. The Staff (Agronomy and Range Science) 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 Plant Science. Internships supervised by a member of the faculty. (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 preenrollment. (P/NP grading only.)

Prerequisite: upper division standing; completion of computer science being tutored or the equivalent. Leading discussions sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/NP grading only.)

Graduate Courses

221A-221B. Applied Crop Physiology (4-4) III. The Staff
Lecture—1 hour, seminar—1 hour, laboratory—6 hours. Prerequisites: courses 101 and 102 or Botany 111, 112 or consent of instructor. Research methods in applied plant physiology with examples drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction, and preparation of laboratory reports.

270. Reproductive Biology of Flowering Plants (3) I. Wu (Environmental Horticulture)
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 111 and Genetics 100. Fundamental mechanisms of reproductive biology of flowering plants and their influence on genetic variation, evolution, and cultural practices. Offered in alternate years.

291. Seminar in Postharvest Biology (1) I, II, III. Salvet (Vegetable Crops) in charge
Discussion—1 hour. Prerequisite: consent of the instructor, open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables and ornamentals. (May grading only.)

298. Group Study (1-5) I, II, III. The Staff
To be arranged.

Plastic Surgery

See Medicine, School of
Political Science

Preparatory Subject Matter

Three courses from Political Science 1, 2, 3, 4, 5, 7

Course 7 may not be taken if course 5 is taken.


Depth Subject Matter

Select two courses each in one of the three fields, listed below. The fields must be chosen from at least two of the following groups: A, B, or C.

Group A

Field (1) Political theory: Political Science 111-119

Field (2) American government: Political Science 100-109, 171, 173-175, 191, 195

Field (3) Parties and political behavior: Political Science 160-167

Field (4) Public law: Political Science 150-159

Field (5) Public administration: Political Science 180-189

Group B

Field (6) Comparative government: Political Science 126, 140-142, 145-149, 177-179

Field (7) International relations: Political Science 120-129

Additionally, upper division units in political science to achieve a total of 36

Only 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

A.B. Major Requirements:

Preparatory Subject Matter

One course from Political Science 1, 2, 3, 4, 5, 7, 4

Two courses from Political Science 2, 3, 4

Recommended Economics 1A-1B

Depth Subject Matter

Two courses from Political Science 100, 104, 105, 106, 113, 180, 181, and one course from Political Science 108, 109, 114.

Internship, Political Science 192A, 192B, or 192W

Research paper, Political Science 193

Choose one field from the three fields above, which must be chosen from 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


(2) Policy implementation and evaluation: Political Science 156, 160, 161, 162, 163, 167, 168, 168; Economics 131

Political Science

(3) Policy interpretation-substance and procedures (public policy) Political Science 150, 151, 152, 153, 155, 156.

(4) Policy areas:

a) Urban policy and implementation: Political Science 101, 102, 191, Economics 125, Environmental Biology and Management 110, Environmental Studies 162, 173.

b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.

c) Environmental policy and implementation—open field that may 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

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

Political Science

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, or Plan II: a 24-unit plan approved by a faculty adviser. Five units of internship may count toward the minor.

Teacher Credential Subject Representative. Consult Departmental Office. See 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.

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, 226 Voorhees Hall, 752-1899. 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, 132, 163. (See also under University requirements.)

Courses in Political Science (POL)

Lower Division Courses

1. American National Government (4) I. Segura; II. Costantini; III. Hill 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. General Education credit: Contemporary Societies.

2. Introduction to Comparative Politics (4) I, II. The Staff 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 more formal political and governmental structures. General Education credit: Contemporary Societies.
3. International Relations (4) I. Ninoic; II. Gartner; III. Goldman
Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

4. Basic Concepts in Political Theory (4) II. Siverson
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. General Education credit: Civilization and Culture.

5. Contemporary Problems of the American Political System (4) I. James
Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies.

7. Contemporary Issues in Law and Politics (4) I. Gates
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 above the 90.5.

98. Special Study for Undergraduates (1-5) II. 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. Political structures and processes of state and local governments in the United States, including counties, cities, and special districts. Emphasizes sources and questions of urban community life, and the political processes of local government. (Not open to students in major or minor in political science.)

101. Urban Problems: Economy (4) I. 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) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among city, suburban, 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.

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 and political issues of federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

104. California State Government and Politics (4) II. The Staff
Lecture—3 hours; research paper. The California political system. Political culture, constution, elections and parties, direct democracy, legislation, governor, executive branch, courts, finances, state-local relations, and policy issues.

105. The Legislative Process (4) I. Segura
Lecture—3 hours; 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.

106. The Presidency (4) III. James
Lecture—3 hours; discussion—1 hour. Optional term paper. The American presidency's origins and development; presidential power and influence as manifested in relationships with Congress, courts, parties, and the public. Analysis of domestic and foreign policy, nominations, campaigns, and elections.

107. Environmental Politics and Administration (4) I. Wiesendanger-Smith
Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and its development as an administrative mechanism for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation.

108. Policy Making in the Public Sector (4) I. The Staff
Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, PPBBS, policy making, the quantitative study of policy determinants, implementation, and proposals for improved policy making.

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, exchange, negotiation, bargaining, coalition formation, and the allocation of public goods, resources and opportunities.

111. Systematic Political Science (4) I. 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.

113. American Political Thought (4) I. Sinopoli
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.

114. Quantitative Analysis of Political Data (4) I. Segura
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.

115. Medieval Political Thought (4) III. Pereman
Lecture—3 hours; term paper. Prerequisite: course 110B. Examination of the ideas central to medieval political thought. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history.

116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher (4) II. Peterman
Lecture/discussion—3 hours; term paper. Intensive study and evaluation of the seminal works of a major political philosopher.

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. Pettman
Lecture—3 hours; term paper. Critical analysis of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

118B. History of Political Theory (4) II. Pettman
Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke.

118C. History of Political Theory (4) III. Sinopoli
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre.

119. Modern Political Thought (4) III. 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. 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) III. 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 major international warfare.

122. International Law (4) III. Wiesendanger-Smith
Lecture—4 hours. Selected topics in international law; territory, sovereignty, immunity, responsibility, the peaceful settlement or non-settlement of international disputes.

123. The Politics of Interdependence (4) I, II, III.
The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. In the past several decades, 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.

124. The Politics of Global Inequality (4) I, III. 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.

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. Examines 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.

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. Bahry
Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movements, ideologies, organizations, strategy, relations among communist parties, problems of leadership and social composition, the Soviet conflict and its effects on revolutionary struggle. Offered in alternate years.

129. Special Studies in International Politics (4) III. Siverson
Lecture—3 hours; term paper. Prerequisite: upper division standing. Examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied.

*Course not offered this academic year.
130. Recent U.S. Foreign Policy (4) I. Goldman; III. Gartner

Lesson—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in the twentieth century with emphasis on transformation of policy during and after World War II. Introduction to analytic tools and concepts useful for understanding current foreign policy issues.

131. Analysis of U.S. Foreign Policy (4) I. Goldman

Lesson—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation and examination of the formulation of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas.

132. National Security Policy (4) II. Gartner; III. Goldman

Lesson—3 hours; term paper. Prerequisite: upper division standing. Development of national security policies since 1945. Analysis of deterrent and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliances, systems, and the international system. Prospects of security and stability through arms control.

133. The American Role in East Asia (4) I. The Staff

Lesson—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on Asian states and the impact of the governmental East Asian policy, missionaries, traders, and returning students. Offered in alternate years.

134. Africa and U.S. Foreign Policy (4) I. Rothchild

Lesson—3 hours; discussion—1 hour. Prerequisite: upper division standing; Science of Politics or consent of instructor. Overview of American foreign policy toward Africa. Relationship to global adversities. Legacies of colonialism. Challenges of national self-determination and white racism. Policies of nonalignment, producer cartels, multinational corporations, continental integration, and trade and aid relations.

135. Russian Foreign Policy (4) II. Bahry

Lesson—discussion—4 hours. Prerequisite: upper division standing; course 3 recommended. Evolution of foreign policy after Soviet rule; the legacies of Tsarism and Bolshevikism; resources, constraints, and capabilities of the "new Russia" in the international system.

136. International Relations in Western Europe (4) II. The Staff

Lesson—4 hours. Prerequisite: upper division standing. Analysis of European unity, problems of the Atlantic alliance, and U.S.-European economic relations. East-West relations, Communism in Western Europe and the relationship between domestic politics and foreign policy.

137. International Relations: East Asia (4) III. The Staff

Lesson—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.

138. Special Studies in Foreign Policy (4) III. The Staff

Lesson—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 different topic is studied.

140. Comparative Public Policy (4) I. Sklabor

Lesson—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist, and fascist experiences.

141. Communist Political Systems (4) III. Bahry

Lesson—3 hours; term paper. Prerequisite: course 3 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.

142. Politics and Inequality (4) II. Jackman

Lesson—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.

143. Politics in the Commonwealth of Independent States and the Baltic (4) II. Bahry

Lesson/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 systems.

144. Russian Politics and Policy (4) II. Bahry

Lesson/discussion—4 hours. Prerequisite: upper division standing and course 2. Democratization, state-building and economic reform; creation of new institutional structures of Soviet rule.

145. Government and Politics in Emergent Nations (4) III. The Staff

Lesson—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and processes in the context of rapid change engendered by social revolution in "emerging countries" and liberation from colonial oppression. Offered in alternate years.

146. Contemporary African Politics (4) II. Rothchild

Lesson—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) II. The Staff

Lesson—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. The Staff

Lesson—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) I. The Staff

Lesson—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and stability 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) III. The Staff

Lesson—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 imperialism 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) II. Rothchild

Lesson/discussion—4 hours. Prerequisite: course 3 recommended. Analysis of the developmental process in sub-Saharan Africa. Emphasis will be placed upon state and state institutions, state-society relations, ethnicity, socioeconomic class, women, ideology, party systems, bureaucracy, military and developmental choices.

150X. Judicial Politics and Constitutional Interpretation (4) I. Gates

Lesson—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking, issues surrounding constitutional interpretation and decisionmaking; prerequisite for courses on the politics of constitutional law.

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4) II. The Staff

Lesson—3 hours, discussion—1 hour. Prerequisite: course 150. The constitutional politics surrounding such issues as the right to free expression, association rights, the right of religious exercise of beliefs, and the right to privacy.

152. The Constitutional Politics of Equality (4) III. The Staff

Lesson—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in alternate years.

153. The Constitutional Politics of the Justic System (4) I. The Staff

Lesson—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. Sinopoli

Lesson—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. Offered in alternate years.

155. Judicial Process and Behavior (4) I. The Staff

Lesson—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.

156. Law and Society (4) III. The Staff

Lesson—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social basis and origins of law, relationship between law, institutions, and social change. Offered in alternate years.

160. American Political Parties (4) I. Costantini

Lesson—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.

161. Comparative Political Parties (4) II. The Staff

Lesson—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) I. Segura

Lesson—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.

163. Group Politics (4) I. James; III. Skalabin

Lesson—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.

164. Public Opinion (4) II. Costantini

Lesson—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.

165. Mass Media and Political Communication (4) III. Costantini

Lesson—3 hours; discussion—1 hour. Organization 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
168. Women in Politics (4) III. The Staff Lecture—3 hours; discussion—1 hour or seminar—1 hour. The role of women in American politics. Historical experiences; contemporary organizations and strategies; legislative bodies; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics.

169. Political Socialization (4) II. Costantini Lecture—3 hours; discussion—1 hour. Prerequisite: course or instructor. An introduction to the process of socialization and the role of schools, family, mass media, and political institutions in the development of political self.

168. Chicano Politics (4) II. The Staff Lecture—3 hours; discussion—1 hour. Political aspects of Chicanos in America, examining the Chicanos political role as it has been historically defined by different groups in society and the Chicanos' response to political environment.

170. Politics and Personality (4) II. Lieberman Lecture—3 hours; discussion—1 hour. How is the conduct of politicians influenced by their personality traits? Course focuses on developing insights into political characters through examination of political figures' personal and professional lives.

171. The Politics of Energy (4) II. Wandelforde-Smith Lecture—discussion—4 hours. Prerequisite: upper-division status in political science and performance of satisfactory work in the course. Examination of the political process for making energy choices at the national and state levels. Emphasizes interaction of energy policy with other political goals and the ability of government institutions to overcome constraints on policy innovation.

172. Community Power and Change (4) II. Jakman Lecture—3 hours; discussion—1 hour. An examination of the relationship between community characteristics and power usage policies in the United States. Alternative models of community power change are presented.

174. Government and the Economy (4) II. Sklabin 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 government policies; supply response to economic conditions; policy alternatives and the public interest.

175. Science, Technology, and Policy (4) III. Hill Lecture—3 hours; discussion—1 hour. Analysis of policy-making 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, technology assessment and scientific policy.

176. Power and Coercion (4) II. Jackman Lecture—4 hours. Prerequisite: course 1 or Sociology 1 recommended. Examination of the meaning, sources, and diverse expressions of power and coercion in life. Sociological views are explored by applying them to a broad range of issues, such as sexual harassment, racial subordination, legislative policymaking, and ideological hegemony.

177. Modern Dictatorships (4) III. The Staff Lecture—3 hours; discussion—1 hour. 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. presidential system.

178. Political Development in Modern Societies (4) I. Jackman Lecture—3 hours; discussion—1 hour. Nature and sequence of political development; its economic and social consequences. Role of elites, military, bureaucracy, and party systems; social stratification and group politics; political mobilization and participation; instability, violence, and the politics of integration.

179. Special Studies in Comparative Politics (4) III. Bahry 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. Wandelforde-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 social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy.

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 organization, and the relationship of structure to performance, at the national, subnational, and local levels.

182. Administrative Decision Making and Public Policy (4) III. The Staff Lecture—3 hours; special assignments. Approaches to and methods of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform.

183. Administrative Behavior (4) III. The Staff Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about the role of government.

187. Administrative Theory (4) I. Hill Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the lights of current concepts, administrative performance, authority and power, communication and control, examination of the role of government bureaucracies in the total society.

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 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 expenditure allocation; tax policy; intergovernmental financial relations: budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

190. International Relations (4) II. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: open to majors in International Relations, or consent of instructor. Analysis and evaluation of international issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals.

191. Special Studies in Local Government and Politics (4) II. 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 work and independent work in one or more communities are emphasized.

192A. Internship in Public Affairs (5) I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with Public Policy/Social Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only)

192B. Internship in Public Affairs (5) I, II, III. The Staff (Chairperson in charge) Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Public Policy/Social Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only)

192W. Internship in the UC Davis Washington Center Program (6-12) I, II. Internship and staff internship—30-35 hours. Prerequisite: junior or senior standing and admission to 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 (2-3,5) 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.

194HA-194HB. 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 a grade-point average of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty advisor. (Deferred grading only, pending completion of sequence).

195. Special Studies in American Politics (4) III. James Seminar—4 hours. Prerequisite: consent of instructor and upper-division standing. Prerequisite: enrollment dependent on availability of one or more special problems appropriate to American politics. May be repeated once for credit when different subject matter is studied.

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. 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, policy-making and political change. Offered in alternate years.

202. American State Government and Politics (4) III. 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. Semianr—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) II. Segura 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) I. 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 decision.

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 for 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. Wardesforde-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) II. Ht 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 of political variables, research design, sampling, descriptive statistics, tabular analysis, measures of association, and introduction to correlation and regression.

212. Quantitative Analysis in Political Science (4) I. Skelton 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 sample size, probability and proportion distributions, hypothesis testing, ANOVA, bivariate regression, and introduction to multiple-regression problems.

213. Quantitative Analysis in Political Science II (4) II. Gartner 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.)

218. Political Theory (4) II. Sinopoli Seminar—3 hours; term paper.

223. International Relations (4) I. Swenson Seminar—3 hours; term paper.

225. The International System (4) II. Swenson 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.

235. American Foreign Policy (4) I. Ninnik Seminar—3 hours; term paper. Relates U.S. political culture to foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision-making and implementation. Concludes by examining linkages between term policy behavior and democratic process. Offered in alternate years.

234. Communist Political Systems (4) III. Bahry 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. The Staff Seminar—3 hours; term paper. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

246. Policymaking in Third-World Societies (4) II. Rothchild Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policy-making process in Third-World countries are such topics as political resources, institutional resources, decision-making, resource allocations, planning, and budgeting, implementation, and distribution of work 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.

260. Political Parties (4) III. Cratantini Seminar—3 hours, term paper. Survey of selected topics in American and comparative parties.

261. Political Behavior (4) II. Segura Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.

274. Political Economy (4) III. The Staff 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) 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) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

*Course not offered this academic year.

292C. 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.

292E. 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.

295C. Research in Comparative Government and Policy (4) II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

299G. 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. The Staff Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit.

298. Group Study (1-5) I, II. The Staff (Chairperson in charge) (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299D. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

390. The Teaching of Political Science (1) I, II. The Staff Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (SU grading only.)

Pomology

(College of Agricultural and Environmental Sciences)

F. A. Bliss, Ph.D., Chairperson of the Department
Department Office, 1045 Wickman Hall (916-752-0123)

Faculty
Fredrick A. Bliss, Ph.D., Professor
Patrick H. Brown, Ph.D., Assistant Professor
Carlos H. Cisneros, Ph.D., Lecturer
Abhaya M. Dandekar, Ph.D., Associate Professor
Theodore M. DeJong, Ph.D., Professor
Louise Ferguson, Ph.D., Lecturer
Thomas M. Gratzer, Ph.D., Assistant Professor
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
John M. Labavitch, Ph.D., Professor
George C. Martin, Ph.D., Professor
Gale McRae, Ph.D., Lecturer
Warren C. Micke, M.S., Lecturer
Dan E. Perlitz, Ph.D., Lecturer
Rita S. Polito, Ph.D., Professor
David E. Ramos, Ph.D., Lecturer
Kenneth A. Shackel, Ph.D., Associate Professor
Douglas V. Shaw, Ph.D., Associate Professor
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Suter, Ph.D., Associate Professor
Steven A. Weinbaum, Ph.D., Professor
Courses in Pomology (POM)

Lower Division Courses

10. The Art and Science of Fruit Production (3) I.
The Staff (Martin in charge).

105. Basic Engineering in Pomology including: Orchard establishment, developmental physiology, and management of the crop through harvest and storage. Two field exercises, on the second and seventh Saturdays in the quarter. General education credit. Nature and Environment.

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge).

Upper Division Courses

101. Tree Growth and Development (4) II. De Jong Lecture—3 hours; laboratory—3 hours. Prerequisites: Biological Sciences 101 or Plant Science 102 or consent of instructor. Physiology of fruit, plant growth and maintenance; species adaptation; responses to environmental and cultural modification (irrigation, soil, and water management, etc.).

102. Principles of Fruit Production (IV) III. Wenban, Grady Lecture—3 hours; laboratory—3 hours. Prerequisites: Biological Sciences 101 or Plant Science 102. The course covers physiological principles underlying cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, flowers and fruits. The course emphasis is on commercially important temperate zone species.

103. Citrus and Other Subtropical Fruits (3) II. Shackel in charge.

120. Water Relations and Mineral Nutrition of Deciduous Fruit Crops (4) III. Carson, Shackel Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 109, Botany 110, 111 or Plant Science 102. Development and distribution of xylem, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms, use of tissue analysis, chelates and deficiency corrections as factors in orchard management. Offered in alternate years.

201. Plant Reproductive Morphology (4) IV. Polito Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: Botany 105, or Botany 111A and 111B. Biology and morphology of flowering plants, sex, development, pollination, self-incompatibility, fertilization, fruit set and fruit morphology. Emphasis on speceies of pomological interest.

212. Postharvest Biology and Biotechnology of Fruits and Nuts (3) III. Kader, Mitcham Lecture—3 hours. Prerequisite: Plant Science 112 or equivalent. Review of postharvest biology of fruits and nuts and different related biotechnological procedures used in handling, emphasizing research needs. Offered in alternate years.

220. Quantitative Genetics and Selection Theory (3) II. Shabbi 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 crops, plants. Topics include: heritability, selection using information from relatives, indirect selection, genetic correlations, multiple trait selection, inbreeding, crop stability, evaluating germplasm.

221. Principles and Practices of Line Cultivar Breeding (3) III. Biss 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 (1-12) I, II, III. The Staff (Chairperson in charge).

299. Group Study (1-12) I, II, III. The Staff (Chairperson in charge).

399. Research (1-12) I, II, III. The Staff (Chairperson in charge).

Graduate Courses

203. Current Perspectives in Fruit Tree Physiology (3) III. Lovisa, Da Jong Lecture—2 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Botany 111, 112 or Plant Science 103, 104. Current advances in physiology related to developmental phenomena specific to various deciduous perennial fruit plants. Offered in alternate years.

205. Water Relations and Mineral Nutrition of Deciduous Fruit Crops (4) III. Carson, Shackel Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 109, Botany 111, 112 or Plant Science 102. Development and distribution of xylem, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms, use of tissue analysis, chelates and deficiency corrections as factors in orchard management. Offered in alternate years.

210. Plant Reproductive Morphology (4) IV. Polito Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105, or Botany 111A and 111B. Biology and morphology of flowering plants, sex, 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 equivalent. Review of postharvest biology of fruits and nuts and different related biotechnological procedures used in handling, emphasizing research needs. Offered in alternate years.

220. Quantitative Genetics and Selection Theory (3) II. Shabbi 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 crops, plants. Topics include: heritability, selection using information from relatives, indirect selection, genetic correlations, multiple trait selection, inbreeding, crop stability, evaluating germplasm.

221. Principles and Practices of Line Cultivar Breeding (3) III. Biss 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 (1-12) I, II, III. The Staff (Chairperson in charge).

299. Group Study (1-12) I, II, III. The Staff (Chairperson in charge).

399. Research (1-12) I, II, III. The Staff (Chairperson in charge).
emphasized. Offered in alternate years. (Same course as 270.)

209. Molecular Evolution (3) II. Gillespie, Langley. Lecture—3 hours. Prerequisite: Biochemistry 101B, course 103 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. (SU grading only.)

212. Topics in Invertebrate Evolution (2) II. Grosberg
Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and course 112-122. Courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. Former course Zoology 212. May be repeated for credit when topic differs. (SU grading only.)

223. Modeling in Behavioral and Evolutionary Ecology (3) I. Mangel
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Course 125 or 155, or the equivalent. Mathematics 131 or Statistics 130A, or the equivalent. Advanced course in theoretical behavioral and evolutionary biology to introduce students to methods that can be used to characterize the fitness associated with different behavioral and developmental adaptations. Will enable students to develop and apply models. Offered in alternate years. Former course Zoology 223.

270. Research Conference in Evolutionary Biology (1) I, II, III. Grosberg
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. Former course Zoology 270. (SU 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, UC Davis graduate and faculty. May be repeated for credit. (SU 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. (SU grading only.)

296. Seminar in Geographical Ecology (2) II. Shapiro
Seminar—2 hours. Prerequisite: course 125 or 145 or Genetics 102 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. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

298. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Preventive Veterinary Medicine
(A Graduate Program)

Group Office, 112 Surge-Vol 916-752-2375(7197)

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, Department of Epidemiology and Preventive Veterinary Medicine.

Director, Thomas B. Farver (Epidemiology and Preventive Veterinary Medicine).

Psychiatry

See Medicine, School of

Psychology

(College of Letters and Science)

Donald H. Owings, Ph.D., Chairperson of the Department

Department Office, 149 Young Hall (916-752-1860)

Faculty

Linda P. Acredolo, Ph.D., Professor, Academic Senate Distinctive Teaching Award
Leo M. Chalupa, Ph.D., Professor
Richard G. Coss, Ph.D., Professor
Rebecca A. Edell, Ph.D., Assistant Professor
Alan C. Eims, Ph.D., Professor
Robert A. Emmon, Ph.D., Associate Professor
Karen L. R. Erickson, Ph.D., Professor
Michael J. Gazzaniga, Ph.D., Professor (Center for Neuroscience)
Gail S. Goodman, Ph.D., Professor
Albert A. Hamon, Ph.D., Professor
Kenneth R. Henly, Ph.D., Professor
Joel T. Johnson, Ph.D., Associate Professor
Neil A. Kroll, Ph.D., Professor
Debra L. Long, Ph.D., Assistant Professor
George R. Mangun, Ph.D., Assistant Professor
Peter R. Marler, Ph.D., Professor (Neurobiology, Physiology and Behavior)
Sally P. Mendoza, Ph.D., Associate Professor
G. Mitchell, Ph.D., Professor
Robert M. Murphy, Ph.D., Professor
Thomas Natsoulis, Ph.D., Professor
Donald H. Owings, Ph.D., Professor
Theodore E. Parks, Ph.D., Professor
Robert B. Post, Ph.D., Associate Professor
Philip R. Shaver, Ph.D., Professor
Stephanie A. Shields, Ph.D., Professor
Dean K. Simons, Ph.D., Professor
Robert Sommer, Ph.D., Professor
Charles T. Tart, Ph.D., Professor
Carol Tomlinson-Kasey, Ph.D., Professor
Nils G. Waller, Ph.D., Assistant Professor
Emeriti Faculty

Jarvis R. Beall, Ph.D., Professor Emeritus
William F. Duke, Ph.D., Professor Emeritus
Joseph Lyons, Ph.D., Professor Emeritus
William A. Mason, Ph.D., Professor Emeritus

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 designed 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 role 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):

Psychology 1, 41 ..................B units
Statistics 13 or 102 ..............A units
Biological Sciences 1A or Biological Sciences 1B and one course from Anthropology 1, Genetics 10, Sociology 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:

Preparatory Subject Matter ..................21-25
Psychology 1 or the equivalent ............4 units
Psychology 41 ..........................4 units
Statistics 13 or 102 ....................4 units
Biological Sciences 1A or a combination of Biological Sciences 1B and one course from Anthropology 1, Physiology 10, Genetics 10 .....................5-8 units
One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units ..........................4-5 units
(Strongly recommended that Psychology 41, and Statistics 13 or 102 be completed in the first year.)

Depth Subject Matter ..................40
Two courses from two of the following three groups and one course from the remaining group ..................21-22
Group A: Psychology 120, 151, 152, 135, 136
Group B: Psychology 108, 129, 134, 150
Group C: Psychology 112, 143, 145, 147, 168
Adviser to units to achieve a total of 40 upper division units in psychology .............18-19

Total Units for the Major ..................61-65

B.S. Major Requirements:

Biological Emphasis

Preparatory Subject Matter ..................46-53
Psychology 1 or the equivalent ............4 units
Psychology 41 ..........................4 units
Statistics 13 or 102 ....................4 units
Honors and Honors Program. In order to be eligible for high or highest honors in Psychology, the student must meet the highest degree category and complete a research project involving a minimum of six units of course work over at least two quarters which represent an original analysis of data on psychological phenomena. Krell recommends that several relevant courses 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 basis for determining eligibility for designating high or highest honors at graduation.

Minor Program Requirements:

One course from each of the following three groups:

Group A: Psychology 130, 131, 132, 134, 136
Group B: Psychology 108, 128, 134, 150
Group C: Psychology 112, 143, 145, 147, 168

Additional units to achieve a total of 20 upper division units

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 from 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.

15. Introductory Psychology (3) I, II, III. The Staff
   Lecture—4 hours. Survey of general education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies.

16. Psychology and Modern Life (3) I, II, III. The Staff
   Lecture—4 hours. Personality development, interpersonal relationships, and the relevance of psychology to social processes. No credit allowed to students who have completed course 1. General Education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies.

20. Freshman Psychology Seminar (4) I, II, III. 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 exposition writing and critical brief presentations.

41. Research Methods in Psychology (4) I, II, III. The Staff
   Lecture—4 hours. 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.

98. Directed Group Study (1-5) I, II, III. The Staff
   (Chairperson in charge)
   Primarily for lower division students. (P/NP grading only.)

*Course not offered this academic year.
132. Language and Cognition (4) I, II, III. Long Lecture—4 hours. Prerequisite: course 1 or the equivalent, course 41, and 16 units of upper division work in psychology or linguistics. Zoological, cultural, and individual perspectives of linguistic actions; their production, perception, cognitive significance, and their relationship to nonverbal conduct, enculturation, and cognitive development.

134. Animal Learning and Motivation (5) I. CoSchedule—5 hours. Prerequisite: course 1 or consent of instructor; course 41. General theories of physiological differences in learning and motivation drawing upon data from laboratory and field observations. Inmate physiological mechanisms, developmental changes, effects of conditioning and other constraints on learning and behavior. An introduction to classical and operant conditioning, and computer simulation.

135. Psychology of Consciousness (4) I, II, III. Natnoules Lecture—4 hours. Prerequisite: courses 1, 41. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.


137. Altered States of Consciousness (4) I. Tart Lecture—4 hours. Prerequisite: courses 1, 41. Characterization and examination of altered states of consciousness from experiential, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, hypnosis, hallucinations, marijuana intoxication, psychedelic drugs, and mystical experiences.


144. Environmental Awareness (4) I, III, Sommer, CoSchedule—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.

145. Social Psychology (4) I, II, III. Simonson, Johnson, Shaver Lecture—4 hours. Prerequisite: courses 1, 41. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying the principles of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. Elms, Emmons, Erikson Lecture—4 hours. Prerequisite: courses 1, 41. The theories of Freud, Eriksen, and other major twentieth-century approaches to personality.

149. Gender and Human Reproduction (4) III. Erikson 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. Comparative Psychology (5) I, II, III. Cuyings, Mitchell Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or consent of instructor: course 41. Perspectives in animal behavior: psychological, ethological, and sociobiological factors, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

154. Primates Psychology (4) Lecture—4 hours. Prerequisite: course 41; course 15 or 15B or an equivalent course in biological sciences and consent of instructor. Comparative survey of primate psychology, based primarily on laboratory experimentation in learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.

160. Health Psychology (4) I, II. Emmons Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15, course 41 Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, and other aspects of health maintenance and promotion. Application of principles in laboratory exercises.

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 taped, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II, III. Emmons, Murphy, Sommer, Waller Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychopathic disorders.

171. Humanistic and Transpersonal Psychology (4) I. Tart Lecture—4 hours. Prerequisite: course 41; course 165 or the equivalent and consent of instructor. Survey, including courses and demonstrations, of humanistic, and transpersonal movements in contemporary psychology. Theory, data, and techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.

175. Genius, Creativity, and Leadership (4) I, Ill. Simonson Lecture—4 hours. Prerequisite: course 1 or 16. 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. General Education credit: Contemporary Societies.

177. Psychobiography and Life History (4) II. Elms Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor; course 41. Case-history research is presented as a nonquantitative approach to studying personality. Psychological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. General Education credit: Contemporary Societies.

180A. Research in General Experimental Psychology (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 41, 175, 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 the content differs.

180B. Research in Psychology (4) III. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 41, 175, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychology (animal learning and motivation, comparative psychology, physiological psychology, sensory psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

180C. Research in Personality and Social Psychology (4) 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 personality and social psychology (personality theory, social psychology, organizational psychology, etc.) Consent of instructor from quarter to quarter. May be repeated once for credit when the specific content differs.

*Course not offered this academic year.

181. Interactive Computer Programming for Psychological Experiments (4) III. 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 designing desktop computer programs as an interactive research tool.

183. Organizational Psychology (4) I. 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 organizational change.

190. Seminar in Psychology (4) I. 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 areas.

192. Fieldwork in Psychology (1-6) I, II, III. Murphy, Somner Internship—3-18 hours; term paper. Prerequisite: upper division standing; consent of instructor. Supervised internship, off- or on-campus, in community and institutional settings. Credit not applicable toward 40 units of upper division psychology required of majors. May be repeated once for credit. Limited enrollment; permission of director of faculty sponsor. (Deferred grading only; pending completion of sequence.)

197T. Tutoring in Psychology (1-5) I, II, III. The Staff Prerequisite: upper division standing and consent of instructor. Tutoring in Psychology Department courses. This course is intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. No more than 6 units may count toward the Psychology major requirement. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N 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 Proseminar (4) I, II, III. The Staff Laboratory/discussion—6-9 hours. Prerequisite: consent of instructor. (S/U grading only.)

204. Advanced Applied Psychometrics: An Introduction to Measurement Theory (4) I. Waller Lecture—4 hours. Prerequisite: course 41; 163. 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, longitudinal measurement, and the modeling of 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 III (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 (4-6)
Simonoff
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 (4-6)
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)
I. Ill. Chalupa, Henry
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

212. Developmental Psychology I (4)
I. 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. Topics in the History of Psychology (4)
I. II. III. The Staff
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A lecture-seminar on selected topics in the history of psychology, and on the applicability of early psychological theory and research to contemporary investigations.

229. Sensory Processes (4)
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A lecture-seminar on selected topics in the history of psychology, and on the applicability of early psychological theory and research to contemporary investigations.

230. Learning (4)
I. Parks, Kroll, Long, Goodman
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theories of learning and memory as applied to the experimental study of simple and complex behavioral processes.

231. Perception (4)
I. Ill. Satoval, Post
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of perception in experience and its effects on behavior.

245. Social Psychology (4)
II. Johnson
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

247. Personality (4)
II. Emmons, Erickson
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. Theory and research in human personality.

251. Topics in Genetic Correlates of Behavior (4)
II. Murphy, Waller
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in genetic contributions to animal and human behavior. May be repeated for credit when topics differ. Offered in alternate years.

252. Topics in Psychobiology (4)
II. Chalupa, Owings, Mendoza
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Special study of a selected area of psychobiology. May be repeated for credit when topics differ. Offered in alternate years.

253. Topics in Cognitive Psychology (4)
I. Acredolo, Goodman, Kroll, Long, Parks, Post, Tartare
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Special 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 topics differ. Offered in alternate years.

264. Topics in Psycholinguistics (4)
I. Long
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Discussion of fundamental issues in the psycholinguistics of language. May be repeated for credit when topics differ. Offered in alternate years.

265. Topics in Psychology of Consciousness (4)
I. Ill. Natsoulas
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Special topics in the psychology of consciousness. Theory and research in the psychology of consciousness. May be repeated for credit when topics differ. Offered in alternate years.

270. Topics in Personality Psychology (4)
II. Ill. Eims, Emmons, Erickson, Shaver
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Critical study of a selected area of personality psychology. May be repeated for credit when topics differ.

279. 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.

286. Group Study (1-5)
I. II. III. The Staff
(SU grading only.)

289. Research (2-9)
II. III. The Staff
(SU grading only.)

290. Dissertation Research (1-9)
II. III. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Course
390A-390B-390C. The Teaching of Psychology (4-4-4)
II. Ill. Murphy
Seminar—2-4 hours. Prerequisite: graduate standing in psychology and consent of instructor. Practical experience in teaching. 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. (Deferred grading only, pending completion of sequence.)

Radiological Sciences
See Medicine, School of

Radiological Sciences
(School of Veterinary Medicine)
Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1114 Medical Science 1A
(916)-752-0184

Faculty
William J. Hornof, D.V.M., M.S., Professor
Philip D. Koblik, D.V.M., M.S., Associate Professor
Thomas G. Nyland, D.V.M., Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
Alain P. Thion, Dr. Med. Vet., Assistant Professor

Emeriti Faculty
Marvin Goldman, Ph.D., Professor Emeritus
Joe P. Morgan, D.V.M., Vet. med. dr., Professor Emeritus

Part-Time Clinical Faculty
Larry Y. Kerr, D.V.M., Associate Clinical Professor
John S. Mattoon, D.V.M., Associate Clinical Professor
Sam Silverman, D.V.M., Ph.D., Clinical Professor
James Tiger, D.V.M., Ph.D., Associate Clinical Professor
Melinda K. Van Vechten, D.V.M., Assistant Clinical Professor
Erik W. Warne, D.V.M., Assistant Clinical Professor

Courses in Radiological Sciences (RVM)

Upper Division Course
199. Special Study for Advanced Undergraduates (1-5)
I. II. III. Radiology Staff
(P/NF grading only.)

Graduate Courses
265A. Principles and Practice of Veterinary Radiation Oncology - A (1.5)
I. Theon
Lecture—1 hour; laboratory—3 hours total. Prerequisite: graduate students in the School of Veterinary Medicine; second- or third-year veterinary students. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465A.) (SU grading only.)

265B. Principles and Practice of Veterinary Radiation Oncology - B (1.5)
I. Theon
Lecture—1 hour. Prerequisite: course 265A. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465B.) (SU grading only.)

298. Group Study (1-5)
I. II. III. Radiology Staff
(SU grading only.)

299. Research (1-12)
I. II. III. Radiology Staff
(SU grading only.)

Professional Courses
508. 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. (SU grading only.)

409. Known Case Conference (1.5)
I. II. III. The Staff
Discussion—6 hours. Prerequisite: a 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. (SU grading only.)

410. Current Topics in Radiological Sciences (1-2) J, 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 mini-lectures covering the broad spectrum of veterinary radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (SU grading only.)

465A. Principles and Practice of Veterinary Radiation Oncology A (1.5) II. The Staff Lecture—1 hour, laboratory—3 hours total. Prerequisite: graduate students in the School of Veterinary Medicine. Second- or third-year veterinary students. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265A. SU grading only.)

465B. Principles and Practice of Veterinary Radiation Oncology B (1.5) II. The Staff Lecture—1 hour. Prerequisite: course 465A. Principles and practice of veterinary radiation therapy. The topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265B. SU grading only.)

**Radiology**

See Medicine, School of

**Range and Wildlands Science**

See Range and Wildlands Science, below, and Range Science

**Range and Wildlands Science**

(College of Agricultural and Environmental Sciences)

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, water sources, 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, supplementing 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 training in range science and animal exploitation 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 parenthetically. More comprehensive courses are acceptable. Courses shown without parentheses are required.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition Requirement</td>
<td>0-6</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>63-67</td>
</tr>
<tr>
<td>Animal science (Animal Science 2)</td>
<td>4</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry (Chemistry 2A, 2B, 2C, 2D, 2E)</td>
<td>16</td>
</tr>
<tr>
<td>Computer science (Computer and Information Science 1, Computer and Information Science 2, Computer and Information Science 21, Computer and Information Science 25)</td>
<td>16</td>
</tr>
<tr>
<td>Econometrics (Economics 110, Economics 111)</td>
<td>6</td>
</tr>
<tr>
<td>Geology (Geology 110, Geology 111)</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics (Mathematics 160, Mathematics 161)</td>
<td>6</td>
</tr>
<tr>
<td>Physical sciences (Physics 1A, 1B, 1C)</td>
<td>16</td>
</tr>
<tr>
<td>Soil science (Soil Science 100, Soil Science 101, Soil Science 102)</td>
<td>12</td>
</tr>
<tr>
<td>Statistics (Agricultural Science and Management 150)</td>
<td>4</td>
</tr>
<tr>
<td>Breadth/General Education</td>
<td>5-24</td>
</tr>
<tr>
<td>Satisfaction of General Education requirement to include no fewer than 3 of the following courses:</td>
<td></td>
</tr>
<tr>
<td>Economics, Environmental Studies, or Geography</td>
<td>6-16</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>51-56</td>
</tr>
<tr>
<td>Plant physiology (Botany 111 or Water Science 104)</td>
<td>4</td>
</tr>
<tr>
<td>Plant ecology (Botany 112 or Plant Science 101)</td>
<td>4</td>
</tr>
<tr>
<td>Meteorology (Geography 3, Atmospheric Science 105)</td>
<td>4</td>
</tr>
<tr>
<td>Soil science, two upper division courses</td>
<td>6-8</td>
</tr>
<tr>
<td>Wastewater management (Water Science 141)</td>
<td>4</td>
</tr>
<tr>
<td>Animal nutrition (Nutrition 115)</td>
<td>4</td>
</tr>
<tr>
<td>Wildlife ecology or management, one upper division course in wildlife and fisheries biology, or environmental science</td>
<td>4</td>
</tr>
<tr>
<td>Forage crops (Agronomy 112)</td>
<td>3</td>
</tr>
<tr>
<td>Select units from Range Science</td>
<td>12</td>
</tr>
<tr>
<td>Range and wildland plants (Range Science 100)</td>
<td>4</td>
</tr>
<tr>
<td>Range ecology (Range Science 133, 134, 135)</td>
<td>4</td>
</tr>
<tr>
<td>Range field course (Range Science 105)</td>
<td>4</td>
</tr>
<tr>
<td>Range livestock production (Range Science 160)</td>
<td>4</td>
</tr>
<tr>
<td>Revegetation of disturbed lands (Range Science 145)</td>
<td>4</td>
</tr>
<tr>
<td>Range Science 181, 198, 199 (not more than a total of 3 units may be counted)</td>
<td>6</td>
</tr>
<tr>
<td>Aerial photo interpretation and remote sensing (Geography 106)</td>
<td>3</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>0-5</td>
</tr>
<tr>
<td>Two upper division natural science or applied biological science courses in one or two of the following: animal science, botany, entomology, geology, geography, mathematics, meteorology, plant pathology, plant science, environmental science, etc.</td>
<td>6-8</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.

**Unrestricted Electives**..........................17-47

**Total Units for the Major**.........................180

**Major Advisor.** Contact department office.

**Advising Center.** For the major is in 133 Hunt Hall.

**Graduate Study.** See under Ecology Graduate Group.
Religious Studies

(College of Letters and Science)

Weimin W. Lai, Ph.D., Program Director
Program Office: 922 Sproul Hall (916-752-9902)

Graduate Courses

*208. Computer Modelling in Range and Crop Management (3). The Staff
Lecture—3 hours. Prerequisite: one course from Agronomy 205B, Agricultural Science and Management 121, Animal Science 126, or Environmental Studies 126. Development of computer models involving dynamic simulation and optimization models in range and crop management systems. Modeling, applications, implementation, validation, and experimentation. Offered in alternate years. (SU grading only.)

209. Seminar in Range Science (1-2). The Staff
Seminar—1-2 hours. Topics of current interest in grassland ecology, range and wildlife management, and related modeling and systems analysis. Offered in alternate years. (SU grading only.)

210. Group Study (1-5). I, II, III. The Staff (Chairperson in charge)

Research (1-12). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Preparatory Subject Matter

Religious Studies

At least one course from each of the following groups:

(a) Religious Studies 1, 2
(b) Religious Studies 21, 22, 40, 60, 70, 75

Additional requirements: Anthropology 2 or, with approval from the advisor, a lower division course related to religion from Philosophy, Native American Studies, African-American and African Studies, American Studies, or other departments.

Depth Subject Matter

Religious Studies

Five upper division courses plus Religious Studies 100 to be taken in junior/senior year.

Total Units for the Major

64

Course Equivalents

The major advises that a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended

A reading knowledge of a foreign language is highly recommended. Consult the major advisor for a complete list of recommended upper division courses.

Minor Advisers:


Minor Program Requirements:

The following four minor program options and others responsive to students' needs are subject to approval by the major advisor and the Curriculum Committee. The four areas of emphasis are Religious Studies, Oriental Religions, Judaism, and Christian Studies.

Religious Studies

Lower division course

Upper division courses

Religious Studies 100 recommended.

Some substitutions from other departments or programs allowed with consent of advisor.

Preministerial Training

Seminar and professional theological schools, as a rule, do not prescribe any specific major program and give equal consideration to all qualified applicants completing a course of study that gives them a broad cultural background. A program combining the Preparatory Subject Matter for the A.B. degree in Religious Studies, with one of the A.B. degree curricula in the College of Letters and Science is an excellent preparation for most seminaries and professional theological schools. A reading knowledge of a foreign language is highly recommended.

Students interested in applying for admission to a theological school should consult the Religious Studies office and make an appointment with the preministerial adviser.

Students are encouraged to take as part of their preministerial training one of the canonical languages: Hebrew, Greek, or Latin.

Preministerial Adviser: L. D. Hurst.

Courses in Hebrew (HEB)

Lower Division Courses

1. Elementary Classical Hebrew (5). I. The Staff
Lecture—4 hours; discussion—1 hour. Introduction to Hebrew alphabet, basic vocabulary, orthography, morphology, and syntax. Readings from the Bible. (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/N grading basis only. Although a passing grade will be charged to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.)

2. Elementary Classical Hebrew (5). II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 1.

3. Elementary Classical Hebrew (5). III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 2.

Courses in Religious Studies (RST)

Lower Division Courses

1. Survey of Religion (4). I, II, III 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, metaphysics, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. General Education credit: Contemporary Societies.

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 religious life. General Education credit: Contemporary Societies.

3A-C. Topics in Comparative Religion (4). I, II, III, and 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 Exponential Dimension: Pilgrimage; (B) The Mythic Dimension: Death and the Afterlife; (C) The Ritual Dimension: Sacrifice. May be repeated for credit in a different subject area. General Education credit for 3A: Civilization and Culture.

4. Eastern Religions (4). I, II, III and staff
Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, and Taoism from their origins to the present.

*Course not offered this academic year.
10. Introduction to Religious Studies (2) I. 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. Old Testament (4.1) I. Janowitz
Lecture/discussion—4 hours. Religion of Ancient Israel, from the time of Abraham to the post-exilic period, as contained in the Hebrew Bible. Emphasis on such key Biblical themes and institutions as: monotheism, revelation, law, covenant, holiness, creation, faithfulness, prophecies, wisdom, and apocrypha. General Education credit: Civilization and Culture.

22. Introduction to Judaism (4) II. Janowitz
Lecture/discussion—3 hours, term paper, introduction to the Period of the Prophets using examples from rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. General Education credit: Civilization and Culture.

40. New Testament (4) I. Hurst

60. Introduction to Islam (4) III. Metcalf
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) II. 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, and 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. Janowitz
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 the various perspectives for meaning and personal identity; how religions frame the problems of life, how cultural and personal crises affect youth; the nature, structure, content, myths, and ideals. Offered in alternate years.

115. Mysticism (4) I. The Staff
Lecture/discussion—4 hours. Prerequisite: one lower division Religious Studies course (except 10, 98, or 99). Course intended primarily for Religious Studies majors. Historical and critical analysis of mystical traditions, and of selected key figures; readings of representative mystical authors.

122. Studies in Biblical Texts (4) III. Janowitz
Lecture—2 hours; term paper. Prerequisite: course 21. Study of a book from the Prophets or writings from historical, historical, and religious perspectives. May be repeated once for credit in different subject area.

124. Topics in Judaism (4) III. Janowitz
Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, literature, or religion. May be repeated once for credit in different subject area.

130. Topics in Religious Studies (4) III, The Staff
Chairperson in charge
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 2 or consent of instructor. Thematically 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) II. Hurst
Lecture/discussion—3 hours; term paper. Prerequisite: course 43 or 42, course 11 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. General Education credit: Civilization and Culture.

141B. New Testament Literature: John (4) II. 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. General Education credit: Civilization and Culture.

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. General Education credit: Civilization and Culture.

145. Contemporary American Religion (4) II. Hurst
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 and History 178B 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 43. Study of the religious basis of ethics through an examination of one of the major traditions 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 43. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with a focus on the Pashupata, Buddhist, and Sikh traditions and their relationship to the mainstream of Hindu religion. Offered in alternate years.

172. Ch'an (Zen) Buddhism (4) I. Hurst
Lecture/discussion—3 hours; term paper. Prerequisite: course 43. Examination of selected topics in the major traditions, as well as the impact of the historical context of the various branches of Buddhism. Offered every other year.

178-E. Undergraduate Proseminar in Religion and Culture (2) II. Close, France
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.

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.)

Reproduction
(School of Veterinary Medicine)
Irwin K.M. Liu, D.V.M., Ph.D., Acting Chairperson of the Department
Department Office, 1136 Medical Science 1A
916-752-1398

Faculty
Domenico Benjosa, D.V.M., Libera Ozen, Associate Professor
Robert H. BonDurant, D.V.M., Professor
Ann Trommershausen, Bowling, Ph.D., Adjunct
Emra Z. Dobris, Ph.D., Assistant Adjunct Professor
Edward C. Feldman, D.V.M., Professor
Bill L. Lasley, Ph.D., Professor
Irwin K. M. Liu, D.V.M., Ph.D., Professor
James Murray, Ph.D., Associate Professor
(Reproduction, Animal Science)
Joan D. Rowe, D.V.M., Ph.D., Assistant Professor

Emeriti Faculty
John P. Hughes, D.V.M., Professor Emeritus
Clay J. Stibbont, Ph.D., Professor Emeritus

Courses in Reproduction (REV)

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

111. Immunogenetic and Electrophoretic Techniques (2) I. Bencomo
Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100 (or the equivalent), or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

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

211. Pathophysiology of Mammalian Reproductive Processes (3) II. Lasley
Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammary concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical
and heredity defects, homosexuality and behavior. Offered in alternate years.

293. Seminar (1) I, II, III. The Staff 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. (SU grading only.)

292. Current Topics in Reproduction (1) I, II, III. Lassey 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. (SU grading only.)

299. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

309. Research (1-12) I, II, III. The Staff (SU grading only.)

Rhetoric and Communication
(College of Letters and Science)
John L. Vohs, Chairperson of the Department
Department Office, 239 AOB 4 (916-752-1221)

Faculty
Don P. Abbott, Ph.D., Associate Professor
Inna Aylacay, Ph.D., Assistant Professor
Leslie A. Becker, Ph.D., Professor
Robert A. Bell, Ph.D., Associate Professor
Charles R. Berger, Ph.D., Professor
Carole Blair, Ph.D., Associate Professor
Stephan H. Brown, Ph.D., Assistant Professor
Michael T. Molloy, Ph.D., Professor
Kent Ono, Ph.D., Assistant Professor
John L. Vohs, M.A., Senior Lecturer

Emeriti Faculty
James J. Murphy, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Ralph S. Porrucy, Ph.D., Professor Emeritus

The Major Program
The major in rhetoric and communication centers on human beings as communicators, on the ways in which we represent and their uses influence our lives.

The Program. The program in study of rhetoric and communication examines communication from several points of view. Courses are offered which deal with both historical and contemporary perspectives. Other classes focus on language and the symbolic components of messages. Persuasion and argumentation are studied as well. In addition, it is important to examine communication as it occurs in various kinds of social situations, and therefore the department also offers courses in public communication, mass communication, interpersonal communication, and organizational communication.

Career Alternatives. Rhetoric and 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 metoric and communication degree is also excellent preparation for law school or other graduate programs.

A.B. Major Requirements:

- Preparatory Subject Matter: Rhetoric and Communication 1, 2, 3, 4, 5, 6, 7, 8.
- Total Units for the Major: 30

Minor Program Requirements:

1. Rhetoric and Communication 1, 3, 5, 6, 7, 8.
2. Literature: courses to satisfy major requirements should be taken with letter grades, except for variable unit courses.
3. Major Adviser. Faculty (contact department).

Minor Program Requirements:

(a) Interpersonal communication: Rhetoric and Communication 103, 105, 130, 134, 135, 136, 138, 152.
(b) Rhetoric: Rhetoric and Communication 113, 121, 122, 124, 125, 126, 151.
(c) Mass communication: Rhetoric and Communication 141, 143, 145, 146, 147, 148, 149.

Total Units for the Minor: 15

Rhetoric and Communication 24

One course from Rhetoric and Communication 3, 5, 6, 7, 8.

A coherent sequence of at least five upper division courses in rhetoric and communication, approved with the approval of a minor adviser.

Graduate Study. The Department of Rhetoric and Communication offers programs of study and research leading to the M.A. degree in rhetoric and communication. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric and Communication.

Graduate Adviser. D. P. Abbott

Courses in Rhetoric and Communication (RCM)

Subject A. Students must have passed the Subject A requirement before taking any course in Rhetoric and Communication.

Lower Division Courses

1. Introduction to Public Speaking (4) I, II, II, II. The Staff Lecture—1 hour; discussion—3 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address.

3. Group Communication (4) I, II, II. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Study of communication in small group situations. Role of communication in various group processes, including leadership and decision-making. Participation in group activities and simulation exercises.


99. Special Study for Undergraduates (1-5) I, II, II. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

103. Analysis of Message Systems (4) I. Baxter 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 communication situations.

105. Semantic and Pragmatic Functions of Language (4) I, II. Motley Lecture—4 hours. Prerequisite: course 115. The role of language in shaping attitudes and perceptions of self and other, the use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse.


113. Current Humanistic Trends in Rhetorical Theory (4) I. Ono, II. Blair Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and rhetoric and technology.

114. Contemporary Theories of Human Communication (4) I, II. The Staff Lecture/discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theory development and testing of hypothesis, general models, theories, and research.

115. Empirical Methods in Communication (4) I. Baxter, II. Bell Lecture—4 hours. Interpretation of formal and informal scientific reports via the logic and methods of scientific inquiry, with emphasis on experimental and descriptive research in communication.

120. Rhetorical Criticism (4) I. Blair, II. The Staff Lecture—4 hours. Survey of critical methods and their use in the interpretation of rhetorical discourse.

121. Public Address in Western Culture (4) II. Browne Lecture—discussion—4 hours. Notable and representative speeches from antiquity to the present. Speeches are examined both as dynamic and significant events in their historical contexts, and as noted instances of rhetorical art.

122. Public Discourse in American Culture (4) II. The Staff Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetoric as it has contributed to and is influenced by American culture. Material content may be repeated once for credit.


125. Freedom of Speech (4) I. Abbott Lecture/discussion—4 hours. Historical development of the contemporary controversy over freedom of speech. Political dissent, symbolic speech, slander and obscenity. Offered in alternate years.

126. Rhetorical Criticism Practicum (4) I. Ono, II. II. The Staff Lecture—4 hours. Prerequisite: course 120. Practice in critical analysis and evaluation of rhetorical events. Application of various critical theories and perspectives in understanding rhetorical situations, genres, ideological positions, effects, and language functions.

130. Group Communication Processes (4) II. Vohs Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership as they relate to communication processes.

134. Interpersonal Communication (4) I. Motley, II. Baxter Lecture—4 hours. Prerequisite: course 1, 3, 5, 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 relevant variables such as shyness, self-disclosure, reciprocally, gender, and conflict.

135. Nonverbal Communication (4) I. 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. Deriving functions served by nonverbal communication will also be considered.

Note: Course not offered this academic year.
136. Organizational Communication (4) I. Vohs, III. The Staff
Lecture—4 hours. Examines communication in various organizational situations. Emphasis is placed on organizational norms and interpersonal communication processes. Offered in alternate years.

138. Communication and Cognition (4) I. Berger Seminar—4 hours. Prerequisite: upper division standing. Seminar—3–16 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Research projects, usually at off-campus sites under department supervision. May be repeated for credit up to 12 units. Units do not count toward major requirement. (P/NP grading only.)

194H. Senior Honors Thesis (4) I, II, III. The Staff (Chairperson in charge) Seminar—4 hours. Individual study and research project—3 hours. Prerequisite: senior standing and approval of Honors Committee. Directed readings, research, and writing culminating in the preparation of honors thesis. May be repeated for credit up to six units. (P/NP grading only.)

197T. Tutoring in Rhetoric and Communication (2-4) I, II, III. The Staff (Chairperson in charge) Seminar—1–2 hours. Prerequisite: upper division standing with major in Rhetoric and Communication and consent of Department Chairperson. Tutoring in undergraduate Rhetoric and Communication courses, including leadership in small voluntary discussion groups affiliated with departmental courses. (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
Senior may take graduate courses with consent of instructor.

210. Contemporary Rhetorical Theory (4) I. Blair Lecture—4 hours. Prerequisite: upper division course in rhetorical theory or equivalent. Rhetorical thought in the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, I. Richards, Richard Weaver, Chauncy Perelman, and Stephen Toulmin.

212. Practices of Inquiry in Rhetoric (4) I. Blair Seminar—4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Examine alternative modes of inquiry in contemporary rhetorical studies. Explores both philosophical groundings and policy implications of these approaches. Emphasizes role of research and writing standards and practices.

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 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 regarding media and violence, women and minorities, political communication, and new technologies.

215. Mass Communication and Social Change (4) I. Alcalay Seminar—4 hours. Prerequisite: upper division standing with major in Rhetoric and Communication or consent of instructor. Group study of social theories in rhetoric and communication. May be repeated once for credit. Enrollment limited.

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.

222. Practicum in Rhetorical Criticism (4) I. Browne Seminar—4 hours. Prerequisite: course 120, or equivalent. Seminar—3–12 hours. Prerequisite: consent of instructor. Analysis of selected primary works in rhetorical and communication theory. Special attention to theoretical and methodological issues.

224. Prospective Symbolic Behavior (4) I. Bax- ter Seminar—4 hours. Prerequisite: course 220. Examina- tion of language and/or other symbolic codes in communication. Involves individual and group projects. May include stylistic variation, speech acts, cognitive processing, communication rules, and audience effects. Offered in alternate years.

230. Persuasion Theory (4) I. Bell Lecture—4 hours. Prerequisite: course 152 or 212, or consent of instructor. Major theoretical perspectives and research programs related to persuasion theories.

244. Organizational Communication (4) I. Vohs Lecture—4 hours. Study of communication processes in organizations. Offered in alternate years.

245. Classical Rhetorical Theory (4) I. Abbott Lecture—4 hours. Prerequisite: course 100 or equivalent. Recent issues in Greek and Roman rhetorical theory, particularly those in the works of Plato, Aristotle, Cicero, and Quintilian. Special attention to problems of invention and style. Frequent seminar reports involving propositions derived from readings.

246. Perspectives on Relational Communication (4) I. Baxter Lecture—4 hours. Prerequisite: course 220. Critical examination of the current state of interpersonal communication. Focus on personal relationships, friendship, romantic, and marital relationships. Issues examined include the role of communication in constructing, maintaining, and disengaging relationships.

247. Theories of Rhetorical Criticism (4) I. Browne Seminar—4 hours. Prerequisite: one course in rhetorical theory and/or criticism. Major theoretical perspectives. Emphasis on contemporary questions of textuality, objectivity, intentionality, and justification.

248. Media Criticism (4) I. The Staff Seminar—4 hours. Prerequisite: a course in criticism. Experiments with media and visual media by means of rhetorical, psychological, sociological, and cultural studies perspectives. Comparison of media and of critical theory scope in understanding media messages. Offered in alternate years.

249. Interpersonal Communication Theory (4) I. Berger Lecture—4 hours. Prerequisite: course 134, 212, or consent of instructor. Major theories and research in interpersonal communication and related research.

250. Special Topics in Rhetoric (4) I. Motley Discussion—4 hours. Prerequisite: consent of instructor. Discussion of select topics in rhetoric and communication. May be repeated for credit on a different topic at the discretion of the instructor.
Emerit Faculty
Valerie A. Tumins, Ph.D., Professor Emeritus

The Major Program
The Russian major exposes 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 6 choice of three emphases. The common basis for the first two is extensive training in the Russian language. The Russian Language emphasis concentrations on the evaluation of Russian literature and contemporary Russian culture. The second area of study, the Russian literature emphasis, focuses on linguistics and practical language skills. The third area, the Russian Area Studies emphasis, offers 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. Study Abroad, and Career Alternatives. 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 AICT at St. Petersburg and Moscow. Russian majors may participate in internships where they can work as translators and interpreters for schools and business firms throughout the United States. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic and interational 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:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>0-38</th>
<th>Language/Literature emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 1 through 6 (or equivalent)</td>
<td>0-30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russian 41, 42</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended for Linguistics

<table>
<thead>
<tr>
<th>Area Studies emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 1 through 6 (or equivalent)</td>
</tr>
<tr>
<td>Russian 41 or 42 (or equivalent course in basic literary analysis)</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Russian Language emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 101A, 101B, 101C</td>
<td>12</td>
</tr>
<tr>
<td>Russian 102 or 103 or 105</td>
<td>4</td>
</tr>
<tr>
<td>Russian 121, 123</td>
<td>8</td>
</tr>
<tr>
<td>Russian 122</td>
<td>12</td>
</tr>
<tr>
<td>Additional upper division units chosen in consultation with adviser</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Russian Area Studies emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 105</td>
<td>4</td>
</tr>
<tr>
<td>Russian 101A, 103, or 104</td>
<td>4</td>
</tr>
<tr>
<td>Russian 190</td>
<td>4</td>
</tr>
<tr>
<td>Three (6) courses to be chosen from Russian 121, 123, 126, 128, 140, 141, 121, 137B, 137C</td>
<td>8</td>
</tr>
<tr>
<td>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 science-Political Science 136, Economics 117, Geography 124</td>
<td>12</td>
</tr>
</tbody>
</table>

*Course not offered his academic year.*

Total Units for the Major: 44-78

Major Adviser. J. Gallant.

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.

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 Language emphasis | 20 |
| Russian 6 | 4 |
| Russian 101A, 101B, 101C | 12 |
| One course from Russian 102, 103, 104, 105, 160 | 4 |

Russian Literature emphasis

| Russian 41 or 42 | 4 |
| Russian 121, 123, and 140 or 141 | 12 |
| One course from Russian 120, 123, 150, 154 | 4 |

Russian Area Studies emphasis

| Three courses to be chosen from Russian 121, 123, 126, 150, 154 (Russian 41 or 42 of the equivalent course in basic literary studies) | 12 |
| One course from History 137B, 137C | 4 |
| One course from Political Science 136, Economics 117, Geography 124 | 4 |

Teaching Credential Subject Representative. J. Gallant. See also Undergraduate Education Program.

Graduate Study. The department offers two programs of study (one with emphasis on language and culture, the other with emphasis in 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 1992-93 academic year.

Graduate Adviser. D. Rancour-Lafuerrie.

Courses in Russian (RUS)

Lower Division Courses

Course Placement. 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 credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP petition, 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.
Scandinavian

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) II. 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 of such writers as the Song of Igor’s Campaign, Zadonschina, Epifany’s Lives, Ivan IV’s cycle of epistles. May be repeated for credit when different topics are studied. 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 such writers as Kantiemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit when different topics are studied. Offered in alternate years.

222. Nineteenth-Century Russian Literature (4) II. Rancour-Laferriere. 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 different topics are studied. 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 major intellectual movements in Russian literature, including Symbolism, Acmeism, and Futurism. May be repeated for credit when different topics are studied. Offered in alternate years.

224. Soviet Russian Literature (4) III. Rancour-Laferriere. Discussion—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 different topics are studied. 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) I. Druzhnikov. Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Origin and history of humor and satire in 18th-20th century Russian literature. Humor and satire as psychological phenomena and in literary theory. Classical writers are studied in satirical and demonstrative Russian. 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.

296. Group Study (1-5) I, II, III. The Staff (Director in charge)

299. Research (1-12) I, II, III. The Staff (Director in charge) (SU grading only)

Professional Course

300. The Teaching of Russian (2) I, II. 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.

Scandinavian

(College of Letters and Science)

Department Office (German and Russian), 422 Sproul Hall (916-752-2114)

Faculty

Fritz Sammen-Frankenberg, Ph.D., Lecturer (Swedish, German)

Courses in Scandinavian (SCA)

Upper Division Courses

110. Masterworks of Scandinavian Literature in Translation (4) I. Sammen-Frankenberg. Lecture—3 hours; written reports. Readings in English translation from Icelandic Saga to the present, treating such major authors as Ludvig Holberg, Sören Kierkegaard, Henry Hope, August Strindberg, Selma Lagerlöf, Pär Lagerkvist. Content varies from year to year. May be repeated twice for credit.

111. Swedish Film as Narrative (4) III. Sammen-Frankenberg. Lecture—3 hours; term paper. Swedish films studied as narratives in the cinematic medium and compared to their literary sources. Offered in alternate years.

Courses in Swedish (SWE)

Lower Division Courses

1. Elementary Swedish (5) I. Sammen-Frankenberg. Discussion—5 hours. Introduction to Swedish grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Swedish 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. 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 Swedish (5) II. Sammen-Frankenberg. Discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

3. Intermediate Swedish (5) III. Sammen-Frankenberg. Discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.


8A. Spoken Swedish (2) I. Sammen-Frankenberg. Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. (P/NP grading only.)

8B. Spoken Swedish (2) II. Sammen-Frankenberg. Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. (P/NP grading only.)

98. Directed Group Study (1-3) I, II, III. Sammen-Frankenberg. Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-3) I, II, III. Sammen-Frankenberg. Prerequisite: consent of instructor. (P/NP grading only.)

Science and Society

(College of Agricultural and Environmental Science)

Howard G. Schultz, Ph.D., Program Director

Program Office, 217 Mirk Hall

Committee in Charge

Patricia J. Berger, Ph.D., Associate Professor (Animal Science)

Jeffrey Granett, Ph.D., Professor (Entomology)

Gloria E. Helfand, Ph.D., Assistant Professor (Agricultural Economics)

Janet L. Hether, Ph.D., Assistant Professor (Environmental Design)

Susan B. Kaiser, Ph.D., Associate Professor (Textiles and Clothing)

David S. Reid, Ph.D., Professor (Food Science and Technology)

Roger J. Romani, Ph.D., Professor (Pomology)

Howard G. Schultz, Ph.D., Professor Emeritus (Food Science and Technology)

The Program. Science and Society is a teaching program designed to offer students throughout the campus the opportunity to discover the interdisciplinary connections that link the social, natural and physical sciences with societal issues and cultural concerns. Coursework examines discovery processes in relation to societal values, public policy and ethics, including issues associated with cultural diversity.

The Science and Society teaching program serves students of all majors and interests in two ways. First, it allows lower division students who have not yet declared a major a meaningful context for exploring diverse subject matters. The curriculum emphasizes the pathways to discovery, the relations among disciplines, and the relevance of the sciences for enhancing the quality of everyday life. Second, the program provides coordination among General Education courses that highlight social-political controversies revolving around such topics as the environment, sustainable agriculture, and human health and development. Courses from diverse departments and disciplines are organized into clusters to enable students to see their interrelations and to understand key science-society interactions.

Courses in Science and Society (SAS)

Lower Division Courses

1. Pathways to Discovery: Science and Society (3) I, II, III. The Staff. Lecture/discussion—3 hours. Introduction to diverse discovery processes pertaining to Science and Society. Course varies with topic offered. May be repeated for credit.

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. Limited enrollment. May be repeated for credit.
98. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: Consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Special Topics: Science and Society (3) I, II, III. The Staff
Lecture/discussion—3 hours. Prerequisite: Varies with topic, consent of instructor. Group study of a special topic emphasizing interactive system approaches in Science and Society. Course varies with topic offered. May be repeated for credit.

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. Limited enrollment. May be repeated for credit.

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: Consent of instructor. (P/NP grading only.)

---

Social Theory and
Comparative History

William W. Hagen, Ph.D., Program Director
Program Office: 204 Regency Square (2nd and D St.), 757-3250

Graduate Study. The program comprises coursework 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 must fulfill all Ph.D. requirements of their home department. The additional requirements leading to the designation 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. oral examination; 3) presentation of a dissertation prospectus, followed by 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)

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. Prerequisites include Center for Comparative Research faculty and visitors discussing current research.

290. Advanced Topics in Social Theory and Comparative History (4) 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, Sociology, and Culture. May be repeated for credit. (SU/NP grading only.)

---

Sociology

(College of Letters and Science)

Fred Block, Ph.D., Chairperson of the Department
Department Office, 113 Young Hall (916-752-0762)
Advising Office, 109 Young Hall (916-752-0766)

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. Ferline, Ph.D., Associate Professor
Jack A. Goldstone, Ph.D., Professor
Bruce M. Hackett, Ph.D., Associate Professor
John R. Hall, Ph.D., Professor
Gary G. Hamiliton, Ph.D., Professor, Academic
Senate DistinguishedTeaching Award
Frank Hirtz, Ph.D., Assistant Professor
Mary Jackman, Ph.D., Professor
Carrie E. Jeffe, Ph.D., Associate Professor (Sociology, Women's Studies)
Carl C. Jorgensen, Ph.D., Associate Professor
John F. Lofland, Ph.D., Professor
Lyn H. Lofland, Ph.D., Professor
Leon H. Mayhew, Ph.D., Professor
Dario Melossi, Ph.D., Associate Professor
Belinda Rottev, Ph.D., Assistant Professor (Sociology, Women's Studies)
Julius A. Roth, Ph.D., Professor
John F. Scott, Ph.D., Professor
Judith Stacey, Ph.D., Professor (Sociology, Women's Studies)
John T. Walton, Ph.D., Professor (Anthropology, Sociology)
Diane L. Wolf, Ph.D., Assistant Professor
Emeriti Faculty

Edwin M. Lerner, Ph.D., Professor Emeritus

The Major Programs

Sociology is the study of human society in all its manifestations. Its aim is to discover the historical and cultural underpinnings of society, and to understand the development of social institutions and the actions of people within society. Sociology is a social science with a wide range of applications in government, business, education, and other fields.

The program offers two majors, Sociology and Sociology-Organizational Studies. Students select one of the two majors based on their interests and career goals.

---

Sociology—Organizational Studies major is designed to develop 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. Majors in Sociology—Organizational Studies are prepared for a variety of career opportunities, particularly in the field of management. The major has been specifically designed to meet 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.

The Department of Sociology sponsors the interdisciplinary minor in War-Peace Studies. Composed of courses from several departments, it is not a minor in Sociology and is entered in transcripts as "War-Peace Studies." For requirements and other details see War-Peace Studies.

SOCIOLOGY MAJOR

A.B. Degree Requirements:

General emphasis

Preparatory Subject Matter: Sociology 1, 2, or 3; 46A and 46B (or the equivalents); Sociology 122, 127, 131, 132, 143B

Total Units for the Major: 68-69

(General emphasis)

Law and Society emphasis:

Preparatory Subject Matter: Sociology 1, 2, 46A and 46B (or the equivalents); Sociology 122, 127, 131, 132, 143B

Total Units for the Major: 55-67

(Law and Society option)

---

Course not offered this academic year.
SOCIOLOGY—ORGANIZATIONAL STUDIES

A.B. Degree Requirements:

Preparatory Subject Matter ........................................... 22

Sociology 1, 46A ......................................................... 9
Economics 1A ............................................................ 10
Mathematics 16A ....................................................... 3
Recommended: Computer Science Engineering 10; Mathematics 16B, 16C

Depth Subject Matter ................................................... 44

Sociology 101, 140, 180 .............................................. 8
Select units from upper division human psych- .......................... 8
ology ................................................................. 8
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, 148B, 157 .......................... 4

Race and Ethnicity
African-American Studies 100; Applied Behavioral Sciences 176; Asian American Studies 110, 111, 150; Chicano Studies 110; Native American Studies 112, 124; Sociology 126, 129, 130 ........................... 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) ....................... 12
194A, 194B ......................................................... 4

Total Units for the Major .............................................. 72

(Clinical psychology, sociology, and social work)

Comparative Studies and World Development emphasis:

Preparatory Subject Matter ......................................... 30-57

Sociology 1, 46A and 46B (or the equivalents) .................. 13
Economics 1A, 1B ................................................... 10
Anthropology 2 ...................................................... 4
Additional units from Geography 2-29; History 10; Political Science 2 ......................................................... 4
Course work in language instruction in modern foreign language equivalent to 26 units at UCD .................................... 26

Depth Subject Matter ................................................... 48

Sociology 141, 145A, 165A, 170 .................................. 16
Economics 115A, Anthropology 126 ......................... 8
At least twelve units from Sociology 118, 120, 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

Total Units for the Major ............................................. 70-105

(Clinical psychology, sociology, and social work)

Additional upper division units selected from:
Sociology 118, 122, 123, 131, 134, 139, 141 .................. 8

Minor Advisers: Consult the departmental Advising Office, 109 Young Hall.

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, 111 Young Hall.

Courses in Sociology (SOC)

Lower Division Courses

1. Introduction to Sociology (5) I. The Staff: II. Hackett; III. Wolf
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.

2. Self and Society (4) I. Feinmee: II. L. Lofland; 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. General Education credit: Contemporary Societies.

3. Social Problems (4) I. J. Lofland; II. Jorgenson; III. The Staff
Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociology. Development of programs for professional improvement. General Education credit: Contemporary Societies.

4. Immigration and Opportunity (4) III. Kramer
Lecture—3 hours; term paper/discussion—1 hour. 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. General Education credit: Contemporary Societies.

25. Sociology of Popular Culture (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Social mechanisms that shape 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. General Education credit: Contemporary Societies.

46A. Introduction to Social Research (4) II, III. The Staff
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) I. The Staff: II, III. Feinmee
Lecture—3 hours; discussion—1 hour or term paper or research project. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily intended for lower division students (not grad students).

99. Special Study for Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.61</td>
<td>Evaluation Research Methods 4</td>
<td>I. Hertz</td>
</tr>
<tr>
<td>106.33</td>
<td>Intermediate Social Statistics 4</td>
<td>J. Cramer</td>
</tr>
<tr>
<td>119.34</td>
<td>Social Psychology I</td>
<td>L. Goldstone</td>
</tr>
<tr>
<td>120.34</td>
<td>Deviation and Society 4</td>
<td>I. Molossi</td>
</tr>
<tr>
<td>123.35</td>
<td>American Society 4</td>
<td>I. Scott</td>
</tr>
<tr>
<td>124.64</td>
<td>Sociology of Education 4</td>
<td>I. Scott</td>
</tr>
<tr>
<td>125.34</td>
<td>Social Problems 4</td>
<td>I. Roth</td>
</tr>
<tr>
<td>127.64</td>
<td>Sociology of Health 4</td>
<td>J. Lolland</td>
</tr>
<tr>
<td>129.64</td>
<td>Sociology of Black Experience 4</td>
<td>J. Jorgensen</td>
</tr>
<tr>
<td>131.34</td>
<td>Family 4</td>
<td>I. Robnett</td>
</tr>
<tr>
<td>132.35</td>
<td>American Society 5</td>
<td>I. Scott</td>
</tr>
<tr>
<td>133.34</td>
<td>Sociology of Race and Ethnicity 4</td>
<td>I. Robnett</td>
</tr>
<tr>
<td>134.34</td>
<td>Economic Sociology 4</td>
<td>I. Block</td>
</tr>
<tr>
<td>139.34</td>
<td>Corporations and Society 4</td>
<td>I. Goldstone</td>
</tr>
</tbody>
</table>

Particular attention to the work of Erving Goffman and to principles of interaction and qualitative analysis.

127. Sociology of Health

Lecture—3 hours; discussion—1 hour or term paper or project (instructor’s option). Prerequisite: course 125 or the equivalent. Overview of death toward, structural or the behavioral methods of coping with death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death rituals in various cultures.

129. Social Stratification

Lecture—3 hours; discussion—1 hour or term paper or project (instructor’s option). Prerequisite: course 127 or the equivalent. 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.

132. Sociology of Black Experience in America

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, 10. 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.

133. Social Stratification and Social Change

Lecture—3 hours; discussion—1 hour or term paper or project (instructor’s option). Prerequisite: course 129 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.

144. Agriculture and Society

Lecture—3 hours; discussion—1 hour or term paper or project (instructor’s option). Prerequisite: course 123 or the equivalent. Course 143A recommended. Critical discussion of the “loss of community” issue. Analysis of the organization of primary ties in the city, the culture of urban public life and of the learning of city skills. Offered in alternate years.

145A. Sociology of Third World Development

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, upper division standing. Introduction to the 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.

145B. Gender and Rural Development in the Third World

Lecture—3 hours; discussion—1 hour. 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.

146. Sociology of Religion

Lecture—3 hours; discussion—1 hour or term paper or project. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Socialization in the modern world and the rise of secular ideologies. Offered in alternate years.
147. Sociological Perspectives on East Asia (4) I. Hamilton
 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) The Staff
 Lecture—3 hours; discussion—1 hour or term paper or research project (oral presentation 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, revolution, economic situations, and religious gatherings, crazes, fads, and fashions.

149. Religion and American Society (4) III. 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 structure. Offered in alternate years.

150. Criminology (4) I. 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 criminal justice process.

152. Juvenile Delinquency (4) I. 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. Roth
 Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis in medicine and health care, with emphasis on the organizational, institutional, and sociological aspects.

155. Sociology of Law (4) I. The Staff; II. Melossi
 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.

158. Consumer-Vendor Relationships (4) I. J. Lofland
 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, leadership, strategies and tactics, development, effects, frequency of use of sound films and media.

157. Social Conflict (4) III. J. Lofland
 Lecture—3 hours; discussion—1 hour or term paper or research 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) II. Roth
 Lecture—3 hours; discussion—1 hour or term paper or research project. Influence of 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) II. Roth
 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.

165A. Sociological Theory (4) I. Melossi
 Lecture—3 hours; discussion—1 hour or term paper or research project. Historical introduction to sociological theory with special reference to its European origins. The development of modern sociological theory in Europe by Durkheim, Weber, Simmel, Pareto, Mosca, and others.

165B. Sociological Theory (4) II. Hall
 Lecture—3 hours; discussion—1 hour or term paper or research project. Contemporary sociological theory with special reference to the history of American sociology and the emergence of contemporary schools of thought in American Sociology. Subjects discussed will include functionalism, symbolic interactionism, exchange theory, and ecology.

170. Population (4) II. Cramer
 Lecture—3 hours; discussion—1 hour or term paper or research project. Study of the human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, sociopsychological factors affecting fertility.

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 cooperation? Offered in alternate years.

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 by American sociologists, by authors such as Talcott Parsons, Lewis, Reiss, and others. Offered in alternate years.

175. Mass Communication (4) I. Lofland
 Lecture—3 hours; term paper. Prerequisite: course 1 or 2. Introduction to social organization of the media and social structures. History of media-state relations. Media as reflector and shaper of values. Emphasis on current European and Marxist theories rather than on content analysis. Offered in alternate years.

176. Sociology of Knowledge (4) I. The Staff
 Lecture—3 hours. Critical analysis of the social foundations of knowledge in society. The history, problems, and dilemmas in sociological theory. Contemporary applications. Natural and social sciences as social systems. Sociology of personal knowledge in everyday life.

180A. Complex Organizations (4) I. Biggart; II. Hackett
 Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Building 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.

180B. Complex Organizations (4) II. Hamilton; III. Hackett
 Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Building 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) III. Lofland
 Lecture—3 hours; discussion/term paper—1 hour. Prerequisite: course 1. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include introduction, decision-making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. Offered in alternate years.

182. Experimental and Utopian Communities (4) III. Hackett
 Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian set-tlements and communitarian movements, including comparison with other small settlement forms: villages, neighborhoods, monasteries, encampments and other settlement communities based on occupation, ethnicity, and religion.

*183. Comparative Organizations (4) III. Biggart
 Lecture/discussion—3 hours; term paper. Prerequisite: course 180A or 180B; upper division standing. Examination of recent organizational changes in nonindustrial societies; reactions to the internationalizing movements of major industrial nations. Discussion of historical, cultural, social, and political influences on organizational 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) III. Jolliffe
 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. 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 public audience. Introduction to sociological analysis of the conditions of good and bad writing. Offered in alternate years.

192. Internship and Research Practicum (2-12)
 The Staff; II. Jorgensen
 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 192 may be counted toward the Sociology major. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4)
 Jolliffe
 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 advisors. (Deferred grading only pending completion of course sequence.)

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
 (Hamilton in charge)
 Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I., II, III. The Staff (Hamilton in charge)
 Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

201. Social Research (4) I. Feldman
 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. Cohen
 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. (SU grading only.)

*Course not offered this academic year.
207A-207B. Methods of Quantitative Research (4-4) II-III. Cohen, Fiala

Lecture—3 hours; seminar—2 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) II. Block Seminar—3 hours; seminar—2 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.

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 current works.

227. Sociology of Reproduction (4) I. Joffe

Lecture—3 hours; discussion—1 hour. Recent social science scholarship in such areas as teenage pregnancy, family planning, abortion, AIDS, and new reproductive technologies; focus on the current situation in the United States. Offered in alternate years.

230. Ethnic (Race) Relations (4) II. Jørgensen

Lecture—3 hours; paper. Advanced study of the dimensions of ethnic and racial customs and their interrelations. Major themes 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.

234. Gender, Family, and Society (4) II. Wolf

Seminar—3 hours; seminar 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 hypotheses; the meaning of analogy, correspondence and causality. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

243. Urban Society (4) I. 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. Walton

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 independence in the global political economy. Offered in alternate years.

248. Social Movements (4) 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. Roth

Seminar—3 hours; paper. Prerequisite: open to graduate or professional students. Sociological perspectives and methodologies in dealing with health 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. (SU grading only.)

255. Sociology of Law (4) III. Melossi

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. Hamilton

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 context of their intellectual development.

265B. Theory in Contemporary Sociology (4) II. Hall

Lecture—3 hours; discussion—1 hour. Prerequisite: course 265A. Explores the theories of contemporary sociologists, 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 and social milieu.

270. Social Demography (4) J. 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. Study of the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies.

280. Organizations and Institutions (4) III. Hackett

Seminar—3 hours; seminar—2 hours, paper. Prerequisite: methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military, and economic organizations. (SU grading only.)

290. Seminar (4) I, II, III. The Staff (Block in charge)

Seminar—3 hours; term paper. (SU grading only.)

292A-292B. Field Research (4-4) II-III. Joffe, Stacey

Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of instructor. The process of collecting data in the form of field notes, diary keeping, tape recordings, and field observations. (SU grading only.)

293. Proseminar in Sociology (2) I. Block Seminar—2 hours. Prerequisite: first-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering the department to its ongoing research activities. (SU grading only.)

295. Special Topics Seminar (4) I, II, III. The Staff (Block in charge)

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 (Block in charge)

Prerequisite: consent of instructor. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Block in charge)

Prerequisite: consent of instructor. (SU grading only.)
Soil Science

See Soil Science, below; Soil Science (A Graduate Group); and Soil and Water Science

Soil Science

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Land, Air and Water Resources.

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 upper-division undergraduate advisor and the Graduate Announcement. See also the Graduate Studies section in this catalog.


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 (916-752-1609).

Lower Division Courses

10. Concepts of Soil Science (3) J. Dahlgren

Lecture—3 hours; laboratory—2 hours; optional Saturday field trip. Not open to students who have received credit for course 100 or similar introductory soil science course. Study of soils as natural bodies formed by interactive environmental processes; their response to use and management; and soil capability classification. Includes conservation practices for preservation of soil resources. Intended for students with diverse interests and backgrounds. General Education credit: Natural and Environmental Science.

92. Soil Science Internship (1-12) II, III, IV

The Staff (Chairperson in charge)

Internship—3-6 hours. Prerequisite: lower division standing and consent of instructor. Work experience of on- or off-campus soil science internship supervised by a member of the faculty. (P/NP grading only)

Upper Division Courses

100. Principles of Soil Science (4) I. Zasoski

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-B, Physics 1A-B, 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 soil, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soils and human society.

102. Soil and Water Chemistry (5) II. Zasoski

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth sciences or consent of instructor. Chemical nature of the mineral and organic components of soil and of the soil solution; ion exchange and other colloidal phenomena including the effect of amendments and fertilizers; microbial processes in soils.

105. Field Studies of Soil Resources (8) Extra- session summer

Dahlgren, Singer, Southard

On campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 120 recommended. In situ soil studies with emphasis on the interactions between soil characteristics and kinds of land use. Field identification and evaluation of soils for agricultural, range, forest, urban, and other uses.

107. Soil Physics (4) J. Rolston

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. Soil Fertility and Fertilizers (4) III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics; conduct and interpretation of soil fertility assays.

111. Soil Microbiology (4) II. Scow

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1B 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 compounds.

118. Soils in Land Use and the Environment (4) Ill. Singer

Lecture—3 hours; discussion—1 hour; two one-day field trips. 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, and bioremediation.

120. Soil Genesis, Morphology, and Classification (5) III. Southard

Lecture—4 hours; laboratory—3 hours (includes five one-weekend field trips). Prerequisite: course 100 and Geology 1, or consent of instructor. Recognition and description of soils; chemical and physical processes of soil formation; soil classification system and emphasis on soil taxonomy.

123. Soil Taxonomy (3) I. Singer, Southard

Lecture—1 hour per week; discussion—1 1/2 hours. Prerequisite: course 120 or consent of instructor. An intermediate course in soil classification. Study and analysis of the current system of classification used by the National Cooperative Soil Survey of the United States. Practice in classrooom. Soil classification will be done on members of the student team. Offered in alternate years.

124. Soil Science Internship (1-12) I, II, III. The Staff

Internship—3-6 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience off or on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only)

186. 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) J. Rolston, Houghton

Lecture—3 hours; discussion/computer laboratory—2 hours. Prerequisite: course 107 and Mathematics 22B, knowledge of a computer programing language, physical and mathematical principles 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) J. Richards

Lecture—3 hours. Prerequisite: course 100, Botany 112, 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.

211. Advanced Soil Microbiology (2) II. Scow

Lecture—2 hours. Prerequisite: Chemistry 8A-BB; course 107, Biological Sciences 1B; PHYS 101A, 101B, 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 characteristic 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.

215. Physical Chemistry of Soils (3) III. The Staff

Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, consent of instructor. Phase transition, colloidal, and surface aspects of the soil system. Offered in alternate years.

216. Disequilibrium and Aqueous Geochemistry (3) I. Casey

Lecture—3 hours. Prerequisite: course 102 or Chemistry 110A or Geology 115, and Mathematics 119. First half: emphasis on 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) I. Singer

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas.

*Course not offered this academic year.
and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in alternate years.

220. Pedology (S) II. Southard
Lecture—1 hour; discussion—2 hours. Prerequisite: courses 120 and 123 or the equivalent, or consent of instructor. Origin, characteristics, and uses of soils. Emphasis given to soil-forming processes, soil-geo- morphic relations, and the importance of soil genesis and morphology to classification and interpretation. Offered in alternate years.

280. Special Topics in Soil Science (1-1) 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. (SU grading only.)

288. Group Study (1-8) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Soil Science
(A Graduate Group)

Ranclai J. Southard, Ph.D., Chairperson of the Group

Group Office, 148 Hoagland Hall (918-752-1669)

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; 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 the soils relative 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. Consult the Group Office.

Emeriti Faculty
Donald G. Castanien, Ph.D., Professor Emeritus Mario Gonzalez, Ph.D., Lecturer Emeritus Osker T. Jahn, Ph.D., Professor Emeritus Daniel S. Keller, Ph.D., Professor Emeritus Antonio Sanchez-Romera, Ph.D., Professor Emeritus

The Major Program

The major program is designed to assure proficiency in all four language skills—speaking, understanding, reading, and writing—and to acquaint 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 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 study tailored to their individual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences. The department encourages its majors to consider summer study in a Spanish-speaking country or to spend their junior year with the Education Abroad Program in Spain, Mexico, or other Spanish-speaking countries.

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:

<table>
<thead>
<tr>
<th>Unit Requirements</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>4-37</td>
</tr>
<tr>
<td>Spanish 1, 2, 3, 21, 22, 23, and 24</td>
<td>0-33</td>
</tr>
<tr>
<td>Spanish 31, 32, 33</td>
<td>0-15</td>
</tr>
<tr>
<td>Linguistics</td>
<td>1-5</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>4-48</td>
</tr>
<tr>
<td>One course in each of the following five areas</td>
<td>19-20</td>
</tr>
<tr>
<td>Spanish 100</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 111, 115, or 116</td>
<td>3-4</td>
</tr>
<tr>
<td>Spanish 130, 131, or 134</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 150, 151, or 157</td>
<td>4</td>
</tr>
<tr>
<td>Spanish 117, 174, or 176</td>
<td>4</td>
</tr>
<tr>
<td>Seven elective courses to be chosen in consultation with the student’s major adviser</td>
<td>28-29</td>
</tr>
<tr>
<td>Students are strongly encouraged to concentrate their elective courses in one or two of the following areas (other combinations are possible with the approval of the adviser):</td>
<td>61</td>
</tr>
<tr>
<td>a) Spanish literature</td>
<td>61</td>
</tr>
<tr>
<td>b) Spanish-American literature</td>
<td>61</td>
</tr>
<tr>
<td>c) Chicano literature</td>
<td>61</td>
</tr>
<tr>
<td>d) Spanish linguistics</td>
<td>61</td>
</tr>
</tbody>
</table>

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), Chicano Studies (e.g., Chicano Studies 154, 155, 156), Comparative Literature, History (e.g., History 161A, 161B, 164, 165, 166A, 166B, 166W, 166WA, 166WB, 169S, 170), and Linguistics (e.g., Linguistics 115, 116). Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major adviser. This cooperation is especially important for students who intend to use their major as preparation for graduate study or who are planning a teaching career.

Total Units for the Major | 49-65 |


Minor Program Requirements:

Spanish | 19-20 |

One course in each of the following five areas | 19-20 |

Spanish 100 | 4 |
Spanish 111, 115, or 116 | 3-4 |
Spanish 130, 131, or 134 | 4 |
Spanish 150, 151, or 157 | 4 |
Spanish 117, 174, or 176 | 4 |

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 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 Spanish are in addition to the regular requirements for the major in Spanish.

Teaching Credential Subject Representative. R. M. Scarl (Master Adviser). See also under Teacher Education Program.

The Master of Arts Degree. 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 study in Spanish for the Master of Arts degree only if recommended by the chairperson of the department. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

The Degree of Doctor of Philosophy. The department 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.

Courses in Spanish (SPA)

Lower Division Courses

1. Elementary Spanish (5) I, II, III. The Staff (Samaniego in charge)
Discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on pronunciation. (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 (Samaniego in charge)
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 (Samaniego 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.

"Course not offered this academic year."
8. Elementary Spanish Conversation (2) I, II, III. The Staff Discussion—3 hours. Prerequisite: course 3. Course 2 is not a prerequisite. 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 further the vocabulary, grammar 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.)


24. Spanish Composition II (4) I, II, III. Blake 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.

31 Intermediate Spanish for Native Speakers I (5) I, II, III. Blake In charge Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 5 or the equivalent. Consent of instructor. First part 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. (Former course 7A.)

32. Intermediate Spanish for Native Speakers II (5) I, II, III. Blake In charge 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) I, II, III. Blake In charge 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.)

86. Directed Group Study (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. Consent of instructor for lower division students (P/NP grading only).

Upper Division Courses

100. Principles of Hispanic Literature and Criticism (4) I, II, III. Altsient, Guillén, Varner 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. S. T. S. 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 major 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 other Romance languages. (Former course 111.)

112N. The Structure of Spanish: Words and Phrases (3) I, II, III. Blake, Oceda Lecture—3 hours. Prerequisite: course 111N. A study of Spanish word and phrase structure, with special emphasis on the grammar of noun and verb phrases. Theoretical and practical comparisons with English and other Romance languages. (Former course 132.)

113. Spanish Pronunciation (3) I, II. Torreblanca Lecture—3 hours. Prerequisite: 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 (3) I, II. Colombo, Oceda Lecture—3 hours; term paper. Prerequisite: course 24 or 33, or consent of instructor. Contrastive analysis of English and Spanish, error analysis, introduction of structuralist and transformational linguistics. Individual and group conferences; substantial written work. (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, Colombo Lecture—3 hours; term paper. Prerequisite: 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. Praxia and Theory (4) I, II. Altsient, Varner Lecture—3 hours; term paper. Prerequisite: 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) I, II. The Staff Lecture—3 hours; term paper. Prerequisite: course 111 and 112. A study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish diatopics, syntax and semantics. May be repeated for credit once when topic differs.

123. Creative Writing in Spanish (4) I, II. Altsient—Discussion—4 hours. Prerequisite: course 24 or 33, or consent of instructor. Intensive writing of poetry or fiction in Spanish or in a selected English-f CPR. 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. Guillén Lecture—3 hours; term paper. Prerequisite: course 100. Survey of Spanish literature (narrative, poetry and drama) to 1700. Emphasis on the multicultural development of the Spanish literature, 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) I. Guillén Lecture—3 hours; term paper. 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, II. Armetstead 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 120A and 103A.)

133N. Golden Age Literature of Spain (4) I, II. Altsient 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 120B and 103B.)

134N. Don Quijote I (4) I. Guillén 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. (Former course 111.) Offered in alternate years.

135N. Spanish Romanticism (4) II. Guillén, 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 characteristics 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. Guillén, 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 bécarense. (Former course 119.)

137N. Twentieth-Century Spanish Fiction (4) II. Altsient Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the major literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender, Cela, Malute, Ayala and others. (Former course 120C.)

138N. Modern and Contemporary Spanish Poetry (4) II. Altsient Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the major literary trends and authors of the modern Spanish novel and short story. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Alexandre, Hernández, Hierro and others. (Former course 120C.) Offered in alternate years.

*Course not offered this academic year.
139. Modern Spanish Theater (4) I. Abisetti 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. (Former course 120B.) Offered in alternate years.

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; 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.

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.)

149. Latin-American Literature in Translation (4) II. Gentel, Jaén, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Spanish American literature from prehistoric texts and the Chronicles of the Conquest to Romanticism and Modernism. Reading selections include fiction, poetry, drama, and essays. (Former course 150B.)

150N. Survey of Spanish-American Literature to 1900 (4) I. Gentel, 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. (Former course 128.) Offered in alternate years.

153. Spanish-American Short Story (4) I. Gentel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Spanish-American literature from Modernism to the present. Reading selections include fiction, poetry, drama, and essays. (Former course 105B.)

155. Mexican Novel (4) I. Gentel, 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 techniques and significant contemporary works. (Part of former courses 108A and 108B.) Offered in alternate years.

156. Dario, Modernism and Its Legacy (4) II. Gentel, 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 techniques and significant contemporary works. (Former course 128.)

157. 20th Century Masters in Spanish-American Literature (4) III. Gentel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Study of 20th-century Spanish-American writers and their works. (Part of former courses 127 and 138.) Offered in alternate years.
231C. Spanish Literature of the Golden Age: Literature of Ideas (4) I. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in alternate years.

231D. Spanish Literature of the Golden Age: Narrative (4) II. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in alternate years.

231E. Spanish Literature of the Golden Age: The Drama (4) II. The Staff
Seminar—3 hours; term paper. Offered in alternate years.

232. Cervantes (4) I. The Staff
Seminar—3 hours; term paper. Major works of Cervantes and of the principal Cervantine critics. Offered in alternate years.

233A. Twentieth-Century Spanish Poetry (4) I. The Staff
Seminar—3 hours; term paper. From 1898 to the Generation of 1927.

233B. Twentieth-Century Spanish Poetry (4) II. The Staff
Seminar—3 hours; term paper. New trends in Spanish poetry from 1927 to the present.

235A. Twentieth-Century Spanish Novel (1900-1939) (4) I. Altisent, Gullón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the modern Spanish novel until the Civil War. Emphasis on Modernism, Generation of 1888, Vanguardism, and other literary trends through selected works by Valle-Inclán, Barja, Urumea, Azorín, Gómez de la Serna, and others. Offered in alternate years.

235B. Twentieth-Century Spanish Novel (4) II. Altisent, Gullón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main narrative trends in the contemporary Spanish novel through discussion of works by Roca, Goytisolo, Martín Santos, Sánchez Fersos, Benet, and others. Offered in alternate years.

236. Twentieth-Century Spanish Thinkers (4) III. Gullón, Sáenz
Seminar—3 hours; term paper. Major thinkers from Ganivet to Urumea and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in alternate years.

237. Twentieth-Century Spanish Drama (4) I. Altisent
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main literary trends and authors of the modern Spanish drama. Dramatists like Valle-Inclán, García Lorca, Bueno Vallejo, Arrabal, Neva, and others will be covered. Offered in alternate years.

238. Spanish Romanticism (4) I. Gullón, Sáenz
Seminar—3 hours; term paper. Sources and development of Romanticism in Spain, particularly in poetry and drama.

239. Galdós and Spanish Realism (4) II. Gullón, Sáenz
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in alternate years.

240. Twentieth-Century Spanish-American Drama (4) III. Gertel
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sánchez to the present. Offered in alternate years.

241A. Spanish-American Novel, 1900-1950 (4) I. Gertel, 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 twentieth century. Offered in alternate years.

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent development in Spanish-American narrative. Emphasis on innovative language and structure. Offered in alternate years.

242. The Mexican Novel (4) II. Gertel, Jáén, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Emphasis on twentieth-century Mexican novels from Azuela, Yáñez, Ruiz, Fuentes to the present. Offered in alternate years.

243. Spanish-American Short Story (4) III. Gertel, Verani
Seminar—3 hours; term paper. Works by major writers, with emphasis on twentieth-century authors such as Quiroga, Borges, García Márquez, Cortázar, and Rulfo.

245. Dario and Modernism (4) I. Gertel, Verani
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1890 to 1916). Offered in alternate years.

247. New Directions in Spanish-American Poetry (4) III. Gertel, Verani
Seminar—3 hours; term paper. Offered in alternate years.

248. The Spanish-American Essay (4) II. Gertel, Jáén, Verani
Seminar—3 hours; term paper. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in alternate years.

251. Studies of a Major Writer, Period, or Genre (4) III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Courses

300. The Teaching of Spanish (3) III. Samaniego
Lecture—3 hours; term paper. Prerequisite: senior or graduate standing; a major or minor in Spanish.

300A. Problems in Teaching Spanish at College Level (3) I. Samaniego
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

300B. Problems in Teaching Spanish at College Level (1) I. Samaniego
Discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (SU grading only.)

392. Teaching Spanish at the Intermediate College Level (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 300A or 300B. Theoretical instruction in intermediate teaching methods and their practical application. Intended primarily for graduate teaching assistants.

---

Speech

See Rhetoric and Communication

---

Statistics

In intercollegiate Division

George G. Rousas, Ph.D., Professor, Chairperson of the Division and Associate Dean of Statistics
Division Office, 469 Kerr Hall (916-752-2361)

Faculty

P.K. Bhattacharya, Ph.D., Professor
Prabir Burman, Ph.D., Associate Professor
Christian Drake, Ph.D., Assistant Professor
Alan P. Feinach, Ph.D., Associate Professor
Wesley O. Johnson, Ph.D., Professor
Yue-Pok (Ed) Mack, Ph.D., Professor
F. Hans-Georg Muller, Ph.D., Professor
George G. Rousas, Ph.D., Professor
Francisco J. Samaniego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Jessica M. Utts, Ph.D., Associate Professor, Academic Senate Distinguished Teaching Award
Jane-Ling Wang, Ph.D., Associate Professor
Emeriti Faculty

Alvin O. Wiggins, Ph.D., Professor Emeritus

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 coursework 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 coursework 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, 22C
Computer Science Engineering 30 or Engineering 5

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 advisor.

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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus</td>
<td>Mathematics 21A, 21B, 21C</td>
</tr>
<tr>
<td>Linear algebra, differential equations, Mathe- matics 22A, 22B, 22C</td>
<td>30</td>
</tr>
<tr>
<td>Computer science, Computer Science Engineering 30 or Engineering 5</td>
<td></td>
</tr>
</tbody>
</table>
Statistics through computers, Statistics 32...3

Depth Subject Matter

Analysis of variance, multiple regression, Statistics 106, 108 (or the equivalent) 6
Probability and mathematical statistics, Statistics 131A, 131B, 131C......12
Three Statistics courses with 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:

(Options: Statistics—General; Statistics—Computer Science)

Preparatory Subject Matter

Calculus, Mathematics 21A, 21B, 21C......12
Linear algebra, differential equations, Mathematics 22A, 22B......6
Computer science, General option......3-4
Computer Science Engineering 30 or Engineering 5 (or the equivalent)......
Computer Science option......10
Computer Science Engineering 30 and 40 and Electrical and Computer Science Engineering 70......
Statistics through computers, Statistics 32......3

Statistics—General option

Depth Subject Matter

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
Three upper division Mathematics courses selected from 106, 127A-127B-127C, 128A-128B-128C, 166 (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

(Generic option)

Statistics—Computer Science option

Depth Subject Matter

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......
Data base systems, Computer Science Engineering 165 or Mathematics 160......3-4
Mathematics, two courses from Mathematics 40, 121 A, 121 B, 121 C......6-8
Computer Science Engineering 122, or Computer Science Engineering 175......3

Total Units for the Major......73-84

(Computer Science option)

Major Adviser, J. L. Wang.

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 133, 133B, 133C and 131B or 131C......5
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 financial support, is available from the Department.

Graduate Adviser, R.H. Shumway.

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-0036).

Courses in Statistics (STA)

Lower Division Courses

10. Statistical Thinking (3) III. Units

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 and in everyday life. Emphasis is on understanding polls, unemployment rates, health studies, etc.; understanding probability, risk and odds. General Education credit: Nature and Environment.

*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.

13. Elementary Statistics (4) I, II. The Staff

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students who have had courses 130A or 131A may not receive credit for Statistics 13.)

13AT. Self-Paced Modular Instruction in Elementary Statistics (4) I. Wiggins

Aututorial—4 hours. Prerequisite: two years of high school algebra. An introduction to 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) I, II. 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.

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, III. The Staff

Lecture—4 hours. Prerequisite: Math 168 or its equivalent. Introduction to probability computation and modeling, estimation, hypothesis testing, contingency tables, ANOVA, regression, and to implementation of statistical methods using a computer package. Students who have taken course 13 may receive only 2 units credit for course 100.

102. Introduction to Probability Modeling and Statistical Inference (4). I, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: two years high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include: probability models—binomial, Poisson, geometric; normal and sampling distributions; graphics, exploratory data analysis; parametric and nonparametric estimation and testing; analysis of variance; regression; computing with Minitab package. Students who have had course 13 may receive only 2 units of credit for course 102.


Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102. 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.

104. Applied Statistical Methods: Nonparametric Statistics (4). II. The Staff


Lecture—4 hours. Prerequisite: course 13, 32, or 102. One- 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.


Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Multiple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages.

*110. Applied Statistical Methods: Multivariate Analysis (3). III. The Staff


120. Probability and Random Variables for Engineers (4) I, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisites: Mathematics 21A, 21B, 21C, and 22A. Basic concepts of probability theory with applications to electrical engineering, discrete and continuous random variables, conditional probability, combinators, random variables, expectations, transformation of random variables, law of large numbers, central limit theorem, and approximations.

*Course not offered this academic year.
130A. Mathematical Statistics: Brief Course (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 18B. 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.

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 hypothesis testing, likelihood ratio tests, goodness-of-fit tests, 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 standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Students who have had Mathematics 131 may not receive credit for this course.

131B-131C. Introduction to Mathematical Statistics (4-4-4) I-II.II. 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 their equivalents; no credit will be given to students majoring in Statistics. Probability, basic properties; discrete and continuous random variables (binomial, normal, t, chi-square); expectation and variance of a random variable; bivariate random variables (bivariate normal); sampling distributions; central limit theorem; estimation; maximum likelihood principle; basic of hypothesis testing (one-sample).

134. Nonparametric Inference (3) II. The Staff
Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference from a set of specific statistical problems and applications. Topics include Kolmogorov-Smirnov type tests; confidence intervals for quantities, location and scale parameters; rank tests, dispersion tests, efficiency. Offered in alternate years.

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 T2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets.

136. Applied Linear Models: Analysis of Variance (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A and any one of courses 130B, 131B, or 133. Review of linear algebra and statistics, problems in a linear model, analysis of variance, advanced topics in analysis of variance, variance components model.

137. Applied Time Series Analysis (3) III. The Staff
Lecture—4 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, autocorrelation and partial autocorrelation, trend, 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: courses 130B or 131B, or courses 106 and 108. Varieties of categorical data, cross-classification, contingency tables, tests for independence, multidimensional tables and log-linear models, maximum likelihood estimation, Poisson- distribution, goodness-of-fit, Logit models, linear log-linear models. Analysis of incomplete tables. Packaged computer programs, analysis of real data.

139. Applied Linear Models: Regression Analysis (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A and any one of courses 130B, 131B, or 133. Simple linear regression, general linear model and examples, point estimation, tests of hypotheses, multiple regression, advanced topics in regression, analysis of covariance.

140A. Introduction to Biostatistics I (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 13 or 102 or the equivalent, and Mathematics 16A and 16B. Basic probability concepts and results; diagnostic tests; common distributions; sampling distributions and central limit theorem; likelihood methods; hypothesis testing; likelihood ratio tests, tests based on the t-distribution and the chi-square distribution.

140B. Introduction to Biostatistics II (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A or 130B. Observational studies; clinical trials; survival analysis; dose-response analysis.

141. Statistical Computing (3) II. The Staff
Lecture—3 hours. Prerequisites: course 130A or 131A or the equivalent. Introduction to Computer Science, Engineering 30 or Engineering 5; knowledge of regression analysis and matrix algebra. Computational aspects of linear models and nonlinear models; development of packaged statistical programs; simulation techniques; graphics.

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; discussion—1 hour. Prerequisite: course 130A or 131A or 131B or consent of instructor. Description and analysis of sample surveys with applications in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse.

145. Bayesian Statistical Inference (3) II. The Staff
Lecture—3 hours. Prerequisites: 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.

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 Project (1-6) 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-I.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 105, 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, nested designs, the Box-Behnken designs, optimal designs based on various criteria, analysis of covariance.

221. Biostatistics I (3) I. The Staff
Lecture—3 hours. Prerequisite: one of the following courses: 231A, 131B, 130B, or 133; and either course 136 and 139, or course 106 and 108. Clinical trials, cross-over design, randomization models, sequential monitoring methods, applications to clinical trials, observational studies, case-control and cohort studies, estimation of risks, diagnostic procedures, dose-response relations, combination of drugs, low-dose extrapolation.

222. Biostatistics II (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231A, 231B, and 231C; or course 230 and consent of instructor. Parametric survival models, nonparametric survival models, semiparametric survival models, applications of survival methods in epidemiology, data analysis, computer packages.

223. Biostatistics III (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231A, 231B, and 231C; or course 230 and consent of instructor. Generalized linear models, longitudinal studies, stochastic models in epidemiology and medicine, advanced biostatistical topics, advanced biostatistical data analysis.

230. Brief Advanced Mathematical Statistics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131A, 131B, 131C, and Mathematics 167, or their equivalent. Distribution theory, modes of convergence, laws of large numbers, central limit theorem, Slutsky’s Theorem, delta-method, consistency and asymptotic normality of maximum likelihood estimates, method of scoring, hypothesis testing based on likelihood ratios, Pitman efficiency, concepts of decision theory, Bayesian inference. Students who have received credit for courses 231A, 231B, or 231C may receive only 2 units, 1 unit, or no credit respectively for course 230.

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 hypothesis testing, multivariate techniques, large sample theory.

232A-232B. Linear Model Theory (4-4) II.III. 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; discussion—1 hour. 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
Statistics (A Graduate Course)

Georges Roussas, Ph.D., Chairperson of the Group

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. is designed to give students a solid foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facilities in computer programming is essential for some of the coursework. 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. The Biostatistics Affinity Group, a subgroup of the Graduate Group in Statistics, has been formed to oversee the recently approved emphasis in biostatistics in the Ph.D. program. For detailed information, see the Graduate Announcement, or contact the Chairperson of the Group.

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: R.H. Shumway.

Subject A

See under University Requirements; and English A.
Textiles and Clothing

(College of Agricultural and Environmental Sciences)
Margaret H. Rucker, Ph.D., Chairperson of the Division
Division Office, 129 Everson Hall (916-752-6650)

Faculty
You-Lou Hsieh, Ph.D., Associate Professor
Susan B. Kaiser, Ph.D., Associate Professor
Emory Menefee, Ph.D., Adjunct Professor
Howard L. Needles, Ph.D., Professor
Ning Pan, Ph.D., Assistant Professor
Margaret H. Rucker, Ph.D., Professor
S. Haig Zeronian, Ph.D., D.Sc., Professor
Emeriti Faculty
Mary Ann Morris, Ph.D., Professor Emeritus

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 consumption of textiles and apparel. (See also Fiber and Polymer Science.)

The Program. The textiles and clothing major offers two options: multidisciplinary and marketing/economics. The multidisciplinary 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 the social and psychological 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 positions within the textile and apparel industry or in related fields, (e.g., merchandising and market research, production, research and development, technical service and design). Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selection of restricted elective coursework.

B.S. Major Requirements: (For convenience in program planning, the usual courses taken to satisfy these 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
Preparatory Subject Matter.........................39-41

Preparatory Subject Matter
Computer science (Agricultural Science and Management 21, Computer Science Engineering 10).................3-4
Economic principles (Economics 10B).............10
History of art or cultural anthropology (Anthropology 2, Art 10H).................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 8, B).........................8

Option-Specific Preparatory Subject Matter

*Course not offered this academic year.
The Minor Program:
The Division of Textiles and Clothing offers a minor program for non-majors interested in satisficing secondary career preparation. Acceptance into the program see the staff advisor in 129 Everson Hall.

Textiles and Clothing .................................................. 18

One course from Textiles and Clothing 6, .......................... 8

4 Courses selected from Fibers and Polymer Science 100, 110, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174, 177 .............................................. 14

Minor Adviser: H.L. Needles.

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


Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized.


Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

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


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 relevant to the study of meaning of clothes in social and cultural contexts. General Education credit: Contemporary Societies.

152. Textile Fabrics (3) I, II.

Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

152L. Textile Fabrics Laboratory (1) I, II.

Laboratory—3 hours. Prerequisite: course 152 (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, Needles.

Lecture—3 hours. Prerequisite: course 6. Fibers and Polymer Science 110, or Chemistry 88. 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) I, II, III.

Needles

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.
be behavioral science (e.g., Psychology 145). Examination of theoretics 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) II. Zeronian
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, III. The Staff
Seminar—1 hour. Critical analysis of selected topics of current interest in textiles. (SU grade 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. (SU grade only.)

293. Recent Advances in Textiles (3) I. The Staff (Zeronian in charge)
Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Critical discussion 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)
(SU grade only.)

Urology
See Medicine, School of

Vegetable Crops
(College of Agricultural and Environmental Sciences)
Alan B. Bennett, Ph.D., Chairperson of the Department
Department Office, 148 Asmundson Hall (916-752-0156)

Faculty
M. Joseph Ahrens, Ph.D., Lecturer
Alan B. Bennett, Ph.D., Professor
Arnold J. Bloom, Ph.D., Associate Professor
Kent J. Bradford, Ph.D., Professor
Marla J. Coakley, Ph.D., Professor
Louise E. Jackson, Ph.D., Assistant Professor
Richard A. Jones, Ph.D., Professor
Richard W. Michelmore, Ph.D., Associate Professor
Donald J. Nevins, Ph.D., Professor
Carlos F. Quiro, Ph.D., Professor
Vincent Rubatzky, Ph.D., Lecturer
Dina S. Clair, Ph.D., Assistant Professor
Mikel E. Selvigt, Jr., Ph.D., Associate Professor
Carol Scheper, M.D., Assistant Professor
Ronald E. Voss, Ph.D., Lecturer
Shang Fa Yang, Ph.D., Professor
John I. Yoder, Ph.D., Associate Professor

Emeriti Faculty
James F. Harrington, Ph.D., Professor Emeritus
Charles A. Lawrence, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor Emeritus
Leonard L. Morris, Ph.D., Professor Emeritus
Haran K. Pratt, Ph.D., Professor Emeritus
Lawrence R. Smart, Ph.D., Professor Emeritus
Charles M. Rick, Ph.D., Professor Emeritus
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor Emeritus
Herma Timmerman, Ph.D., Professor Emeritus
James E. Welsh, Ph.D., Lecturer Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus

Graduate Study. A program of study is offered leading to the M.S. degree in Vegetable Crops. Information can be obtained from the graduate adviser. Also see the Graduate Studies section in this catalog.

Graduate Adviser. H. Timmerman.

Related Courses. See Plant Science 2, 101, 102, 112L, 113, 221A, 221B.

Courses in Vegetable Crops (VCR)
Questions pertaining to the following courses should be directed to the instructor or to the Vegetable Crops Office, 113 Mann Laboratory.

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
101. Principles of Vegetable Crops Production (4) III. Jones
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C and/or Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution.

105. Biology, Evolution, and Systematics of Vegetables (3) I. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing and Plant Science 2 recommended. Taxonomic and horticultural classification of the more important vegetable cultures, their origin, morphology, nomenclature, and description; wild vegetable species, minor and exotie vegetables, and trends in development of new cultivars. One or more field trips and written and oral report.

*118. Seed Production, Technology, and Physiology (4) III. Bradford
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 112; Genetics 100 or Plant Science 113 recommended. Principles of crop seed production, storage, and utilization. Physiological, developmental, genetic, and environmental factors influencing seed quality. Biological and technological aspects of crop establishment from seeds. Laboratory sessions include field trips to seed industry facilities. Offered in alternate years.

190. Topics in Plant Science Research (1-12) I, II. The Staff
Discussion—1 hour. Prerequisite: undergraduate standing in the plant or biological sciences. Discussion and critique of current research by faculty, graduate students, and undergraduate students. May be repeated for a maximum of 3 units. (P/NP grading only.)

191. Undergraduate Research: Proposal (3) I. The Staff
Lecture—1 hour; discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and consent of instructor. Faculty sponsor will individually assist each student to define a problem, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a written outline, and write and revise a draft report. (P/NP grading only.)

191L. Undergraduate Research: Experiment (1-5) I, II, III. The Staff
Laboratory—3 to 15 hours. Prerequisite: course 191 (may be taken concurrently) and consent of instructor. Experimental testing of the hypothesis developed in course 191. May be repeated for credit. (P/NP grading only.)

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.)

194. Senior Honors Thesis (1) I, II, III. The Staff
Independent study—3 hours. Prerequisite: course 191L and consent of chairperson. Preparation and submission of honors thesis and presentation of the results in a seminar. (P/NP grading only.)

195. Field Study of Vegetable Industry (1) III. Jackson
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. To be given between winter and spring quarters. Considered a spring course for preenrollment. (P/NP grading only.)

197. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)
Laboratory—5-9 hours. Prerequisite: consent of instructor. Voluntary tutelage of junior and senior 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
201. Management of Vegetable Production Systems (3) II. Jackson
Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Overview of management practices utilized in vegetable production systems, emphasizing the balance between resource inputs and crop productivity. Topics include management of water, nutrients and energy, pest control strategies and comparative analysis of contemporary systems for fresh market and processing production.

212. Postharvest Physiology of Vegetables (4) III. Salveti and Yang
Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 112 or Plant Science 112. 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.

220. Biotechnology and Genetics of Crop Improvement (3) I. Michelmore
Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113; Genetics 102A, 102B recommended. Emphasizes the integration of modern biotechnology and classical plant breeding including: transposable elements, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, gametophyte selection, disease and stress resistance.

220L. Biotechnology and Genetics of Crop Improvement Laboratory (1) I. Michelmore
Lecture—3 hours. Prerequisite: course 220 concurrently. Several class projects in plant genetics and biotechnology: tomato genetics, isozyme segregation, Agrobacterium mediated plant transformation, self-incompatibility in Brassicaceae, mapping disease resistance genes.

221. Genetics and Cytogenetics of Vegetable Crops (3) III. Quiro
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.

221L. Genetics and Cytogenetics of Vegetable Crops Laboratory (2) Ill. Quorus Laboratory—6 hours. Prerequisite: course 221 (may be taken concurrently). Genetic and cytogenetic techniques applicable to vegetables. Includes chromosome and linkage studies involving various techniques. Credit will not be given for both the classical and molecular genetics. Research information about plant transposable elements. Topics include the discovery, molecular structure, evolutionary significance and practical uses of these fascinating genetic entities. Offered in alternate years.

228. Plant Molecular Biology Laboratory (5) Ill. Bennet, Harada (Botany) Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics, and consent of instructor. 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.)

230. Selected Methods in Vegetable Research (3) Ill. Bennet Lecture—1 hour; laboratory—6 hours. Prerequisite: one course from Plant Science 102, Botany 111, 112, Biochemistry 101A-101B or 101L. Survey of the theory and practice of certain laboratory methods and techniques used in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions, and cell/tissue culture. Offered in alternate years.

290. Seminar (1-3) Ill., III. The Staff Discussion—1 hour. (SU/GU grading only.)

291. Special Topics in Vegetable Crops (2) I, The Staff (Chairperson in charge) Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topics and speakers determined by instructor in charge. Assignments include brief evaluation of a lecture, and pertinent narrative or grant proposal. May be repeated for credit. (SU/GU grading only.)

296. 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) (SU/GU 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. (SU/GU grading only.)

Veterinary Anatomy and Cell Biology

Veterinary Medicine, School of

291. Topics in Biology of Respiratory System (1) I, II, III. Tyler, Hyde, Popper, Wu, Pankratz 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. (SU/GU grading only.)

292. Topics in Neuroscience Research (1) III. Cermignoni Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate appropriate methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (SU/GU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU/GU grading only.)

Veterinary Medicine, School of

Veterinary Anatomy and Cell Biology

291. Topics in Biology of Respiratory System (1) I, II, III. Tyler, Hyde, Popper, Wu, Pankratz 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. (SU/GU grading only.)

292. Topics in Neuroscience Research (1) III. Cermignoni Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate appropriate methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (SU/GU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU/GU grading only.)

Veterinary Medicine, School of

291. Topics in Biology of Respiratory System (1) I, II, III. Tyler, Hyde, Popper, Wu, Pankratz 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. (SU/GU grading only.)

292. Topics in Neuroscience Research (1) III. Cermignoni Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate appropriate methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (SU/GU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU/GU grading only.)

Veterinary Medicine, School of

291. Topics in Biology of Respiratory System (1) I, II, III. Tyler, Hyde, Popper, Wu, Pankratz 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. (SU/GU grading only.)

292. Topics in Neuroscience Research (1) III. Cermignoni Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Students will examine current topics in neuroscience research literature, as well as evaluate appropriate methods, results, interpretation of data, and relevance of studies. Possible topics include pain, autonomic nervous system, neurotransmitter regulation of gene expression, neuroendocrine-immune interactions, stress. (SU/GU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU/GU grading only.)

Courses in Veterinary Medicine and Cell Biology (ANA)

Upper Division Courses

100. Comparative Organography of Vertebrates (4) II. Popper Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 15. Integrative study of the organization of cells and tissues into organs and organs systems within vertebrates. The following organ systems will be compared between fish, amphibian, reptile, avian, and mammalian: muscular-skeletal, 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. Organography (2) II. The Staff (Chairperson in charge) Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative developmental, 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 stereochemistry, 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 (Fauklin in charge) Lecture—3 hours; laboratory—9 hours. Prerequisite: biological sciences 15. The microscopic anatomy of tissues and organs of mammalian and avian species of veterinary significance.

233. Tumor Biology (3) I. The Staff (Fauklin 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.

*Course not offered this academic year.
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.

407A. Principles of Operative Surgery (0.8) III. Brozniak Lecture—7 hours; laboratory—1 hour three-session. Prerequisite: second-year standing in the School of Veterinary Medicine. Principles of operative surgery, including such topics as asepsis, sepsis, instrumentation, hemostasis, wound healing, and others.

407B. Principles and Techniques of Surgery (2) I. Pascoe Lecture—8 hours; laboratory—9 hours; three sessions; discussion—3 hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Continuation of course 407A. Introduces the veterinary student to technical aspects of surgical science. Speciﬁc operative procedures performed by the student provide opportunity to learn fundamental skills of asepsis, instrument identiﬁcation and manipulation, knot tying, hemostasis and tissue dissection.

407C. Surgical Anatomy (1) I. Stover Laboratory—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Study of anatomical topics as applied to selected surgical operations. Topographical features of speciﬁc surgical organs and structures described. Tissues and structures basic to surgery emphasized.

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) I. Kass 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.

411A. 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 and demonstrations with subject species will be provided.

412. Laboratory Animal Medicine (2) II. Brooks Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention of disease. Credit. Applied knowledge and skills in the use and management of laboratory animals with an emphasis on the care and use of non-human primates. (SIU grading only.)

414A. Principles of Veterinary Pharmacology and Toxicology (2.4) I. Joy Lecture—22 hours; laboratory—3 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Provides a basic foundation for understanding of pharmacology and toxicology. Introduces principles of pharmacology and begins consideration of drugs by pharmacological class.

414B. Veterinary Pharmacology (1.8) II. Giri Lecture—17 hours; laboratory—1 three-hour session. Prerequisite: second-year standing in the School of Veterinary Medicine. Principles of the pharmacology of several classes of drugs which are of major importance in veterinary medicine.

414C. Veterinary Toxicology (2.1) III. Segall Lecture—21 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. General principles of toxicology, mechanisms of carcinogens, teratogens, and genetic and immunotoxicants. Course also discusses the biological effects of toxic substances of biological and industrial origins in animals.

415. Management and Diseases of Captive Wildlife (2) I. Fowler Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Lectures, demonstrations, and discussions used to illustrate selected medical problems of captive wild animals.

415A. Aquatic Animal Medicine (2) I. Heddick 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 some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

417. Cage Bird Medicine (2) II. The Staff Lecture—20 hours. Prerequisite: third-year veterinary medical student or consent of instructor. Approved for graduate degree credit. Medical and surgical problems of caged birds, hermit crabs, freshwater, tropical and exotic rodents, and larger pets. (SIU grading only.)

418. Diseases of Free-Living Wildlife (2) III. Boyce Discussion—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures on the ecology and epidemiology of disease in free-living wild animals including management of free-living populations.

418L. Diseases of Free-Living Wildlife Laboratory (3) III. Boyce Lecture—1 hour; laboratory—90 hour total. Prerequisite: third-year standing in the 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.

419. Virology (2.7) II. Zee, Yilmaz Lecture—19 hours; laboratory—8 three-hour sessions. Prerequisite: first-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 aspects of infectious diseases of animals.

420. Immunology (3.0) III. Gershwin Lecture—20 hours; laboratory—15 three-hour sessions. Prerequisite: first-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 aspects of infectious diseases of animals.

421. Principles of Neurasciences (2.7) II. Cummings Lecture—20 hours; laboratory—3 three-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. An integrated study of normal neurobiology, neuromonitoring, and neuropharmacology to enable students to engage in studies of neurologic disorders and clinical neurology.

422. Veterinary Ophthalmology (1.1) I. Bellhorn Lecture—12 sessions; laboratory—2 sessions. 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.

423. Small Animal Ophthalmology (2) III. Baylunch 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.

*Course not offered this academic year.
423L. Small Companion Animal Ophthalmology Laboratory (0.5) III. Buy Lemhini, Belthorn Laboratory—2 four-hour sessions. Prerequisite: course 422 or the equivalent and concurrent enrollment in course 423. Approved for graduate degree credit. Ocular surgery laboratory. (SU grading only.)

424. Case Studies in Veterinary Oncology (1) I. Madowew Lecture—10 hours. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides veterinary students with an opportunity to develop the reasoning processes between pathology, hematology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.

43A-43B. Clinical Hematology and Biochemistry (4.0–4.5) I, II. Ziniv Lecture—36 sessions/16 sessions (43A/43B); laboratory—14 sessions/5 sessions; discussion—4 sessions (43B only). 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 hemolympathic, exfoliative, cytologic, and clinical biochemical systems provide critical information which aids veterinarians in assessing physical status and in understanding the etiopathogenesis of disease.

436. Veterinary Public Health and Food Safety (2.4) II. Gengegorics Lecture—24 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the prevention and spread of zoonoses, protecting the consumer from disease problems associated with consumption of foods of animal origin. Emphasis on public health issues having to do with their profession and animals.

436. Public Health and Food Safety (2.4) III. Gengegorics Lecture—30 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Introduction to preventive aspects of veterinary medicine as they relate to zoonoses, environmental hygiene and the safety of foods of animal origin.

437A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communications (0.8) I. Brooks 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. (SU grading only.)

437B. Ethics and Issues in Veterinary Medicine (0.8) II. Brooks Discussion—8 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Continued introduction to responsibilities of veterinarians to society through their role as health care providers. (SU grading only.)

438. Introduction to Methods of Animal Handling, Restraint, Examination, and Therapy (1) III. East Laboratory—3 three-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. 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. (SU grading only.)

439. Beef Cattle Nutrition (2.0) III. Holstein Lecture—20 hours. Prerequisite: first-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Provides a basic understanding of the principles of the normal physiological function of the endocrine glands, their hormones, and other factors that affect the regulation of metabolic processes.

443. Behavior Clinic (2) II, III, IV. Haert Laboratory—3 hours; discussion—2 hours. Prerequisite: second year standing in the School of Veterinary Medicine and course 456. Clinical training in behavioral therapy. Students work with clients and patients through the Behavioral Services Outpatient Clinic. Case record work-ups with selected presentations of cases during discussion sessions.

444. Clinical Endocrinology (1.5) II. Feldman Lecture—12 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. A correlated review of common endocrinology disorders affecting the dog and cat.

445C. Food Animal Theriogenology (3) III. Bon-Durant Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

445D. Equine Theriogenology (3) III. Liu Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory data.

446A. Reproduction (4.2) II. Liu 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).

446B. 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.

446C. Food Animal Reproduction (1) III. Bon-Durant 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. Emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

446D. 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.

447. Basic Medicine of Domestic Animals (4.7) II. Cowgil Lecture—45 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the fundamental principals, 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.

448A. Small Animal Medicine—Level 1 (6.0) I. Nelson Lecture—5 hours (for 12 weeks). Prerequisite: course 447. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of the dog and cat. Courses is a core option for the professional veterinary curriculm and is preparatory for the advanced courses in small animal medical diagnosis and therapeutics.
448B. Small Animal Medicine—Level II (5.4) II. Hart
Lecture—37 hours. Laboratory: 13 hours, discussion—4 hours. Prerequisite: course 447 and 448A. Fundamental principles of clinical investigations, diagnostic methods and therapeutic approaches to the medical diseases of the dog and cat. Course is a core option for the professional veterinary curriculum and preparatory for small animal medical diagnosis and therapeutics.

449A. Large Animal Medicine—Level I (6.1) I. Wilson and staff
Lecture—5 hours (for 12 weeks); laboratory—3 hours (for 2 weeks). Prerequisite: course 447. Instruction in the large animal pathophysiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of important infectious and noninfectious diseases of Food Animals and horses. A practical basis for veterinary 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 advanced equine pathophysiology, including large and small farm management practices, sports medicine principles and applications, perinatology and neonatology and the etiology, epidemiology, and control of infectious and noninfectious diseases of the equine.

444L. 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. (SU grading only.)

451. Veterinary Bacteriology and Mycology (4.5) I. Hirsch
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. Wilson
Lecture—10 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 control of various organisms responsible for creating a disease situation. Illustrations of how the application of general pathological principles is used to determine disease pathogenesis and prognosis. (SU grading only.)

455. Immunology System (4.9) II. Starcher
Lecture—49 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Course covers structure, function, pathologic and clinical aspects including therapeutics of the integumentary system and diseases of the integumentary system of animals. (Deferred grading only, pending completion of two- quarter course.

456. Law and Ethics of Veterinary Profession (1.8) III. Wilson
Lecture—16 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional practice. (SU grading only.)

457. Veterinary Business Management (2.1) 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 ground work for work of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (SU grading only.)

458. Behavioral Therapy (1.1) 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.

459. Systemic Pathology (4.9) II. MacLachlan
Lecture—36 hours, laboratory—14 four-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Presents a basic understanding of the pathobiology of major organ systems relevant to a variety of animal conditions. Emphasis will be on the mechanisms of injury, patterns of response to injury and on balance between damage and repair.

460. Emergency and Critical Care Patient Care (2 II. Hasker
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critical ill patients.

461. Small Animal Orthopedics (1.7) II. The Staff
Lecture—1 hour, laboratory—3 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Approved for graduate degree credit. Surgical approaches to joints of the shoulder, hip and stifle, appendicular and axial elements, ankle, radius, ulna, pelvis, femur, tibia, and metaphyseal fractures.

462. Radiographic and Ultrasonographic Diagnosis: Small Animal (1.7) III. Homor
Lecture—discussion—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Students will be supplied with small animal radiographic and ultrasonographic case studies. Weekly discussions and written case report sections to be held to discuss assigned cases in small groups with instructors. Limited enrollment.

463. Soft Tissue Surgical Diseases (2 II. Gregory
Lecture—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.

464. Therapeutic and Restraint Procedures of Food Animals (0.5) II. George
Laboratory—three 3-hour sessions; lecture—1 session. Prerequisite: course 447, Introduction to animal restraint and therapeutic techniques. (SU grading only.)

465. Mixed-Large Animal Anesthesia (1.5) I. 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 current trends in anesthesia of a variety of species including horses, swine, ruminants, large non-domestic species, cats and dogs. (SU grading only.)

466. Small Animal Anesthesia (1.5) II. Ikwikw;
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 any anesthetic. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

467. Equine Lameness and Radiology (4 III. Meagher, O’Brien, Pool
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of conditions that cause lameness in the equine patient. Methods used in large-animal radiography will be illustrated and latest technology for taking equine lameness will be demonstrated. Anatomy and pathologic of some areas of the musculoskeletal system will also be presented.

468. Equine Lameness and Radiology (1 III. Meagher, O’Brien, Pool
Laboratory—10 three-hour sessions. Prerequisite: course 468 (concurrence). Priority enrollment for students in equine track; others with consent of instructor. Limited enrollment.

469. Equine Surgery (2 II. Pasco
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Designed to allow third-year veterinary students additional training and experience with surgical procedures in the horse.

470. Equine Surgery Laboratory (1 II. Pasco
Laboratory—10 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Clinical training in veterinary Medicine. Assignments in the medical and surgical services and clinical diagnostic services of the Veterinary Medical Teaching Hospital. (SU grading only, pending completion of sequence.)

471. General Practice Clinics (2.5-15) III-III; Summer (Sessions I and II) and I, II, III, IV, V
Clinical practice in small animal diseases and considerations. (SU grading only, pending completion of three-year sequence.)

472. Urban Practice Clinics (2.5-15) III-III, IV-IV, V-IV
Clinical practice in small animal diseases and considerations. (SU grading only, pending completion of three-year sequence.)

473. Large Animal Practice Clinics (2.5-15) III-III, IV-IV, V-IV
Clinical practice in large animal diseases and considerations. (SU grading only, pending completion of three-year sequence.)

474. Equine Practice Clinics (2.5-15) III-III
Clinical practice in equine diseases and considerations. (SU grading only, pending completion of three-year sequence.)

475. Food Animal Practice Clinics (2.5-15) III-III
Clinical practice in food animal diseases and considerations. (SU grading only, pending completion of three-year sequence.)

*Course not offered this academic year.
training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services related to food animal 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 small animal and equine species. May be repeated for credit. Students in combined DVM/MVPM program enroll for the Summer Sessions I-II and I-sequences. (SU grading only, pending completion of three-term sequence.)

476. Zoological Practice Clinics (2.5-15) I, II, III. Hjerpke Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. 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/MVPM program enroll for the Summer Sessions I-II and I-sequences. (SU grading only, pending completion of three-term sequence.)

477. Companion Animal Practice Clinics (2.5-15) I, II, III. Hjerpke Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Summer Session students must be enrolled in the DVM/MVPM degree program. Clinical training in veterinary medicine. 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/MVPM program enroll for the Summer Sessions I-II and I-sequences. (SU grading only, pending completion of three-term sequence.)

478. Small Animal/Food Animal Practice Clinic (2.5-15) I, II, III, Summer. Hjerpke 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. (SU grading only.) (Deferred grading, pending completion of sequence.)

481A-481B-481C. Clinic Rounds (1-11) I-II III. Lui, 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. (SU 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. (SU grading only.)

484. Ruminant Nutrition and Physiology (3) I. Bruss, Morris Lecture—2.7 hours, laboratory—0.9 hours. Prerequisites: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division veterinary physiology (e.g., Animal Physiology 110). Biochemistry (e.g., Biological Sciences 102 and 103) or physiological chemistry (e.g., Physiological Sciences 110, 111, 105B) or equivalent. Basis and applicability of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants.

486A. Equine Clinical Neontology (1) I. Medigan 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. (SU grading only.)

486B. Equine Clinical Neontology (1) III. Medigan 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. (SU grading only.)

487. Comparative Bio-Medical: Form and Function (2) III. Brooks 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, including comparative biology recommended concepts for nontraditional animal species or alternative pets, zoos, rehabilitation centers, aquaculture, laboratory animals, and non-human primates.

488. Nondomestic Pet Animal Medicine (2) II. Brooks 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. Professional, 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 budgeting and personal finance, marketing and sales, and understanding and using contracts and the legal system. (SU grading only.)

490A. Hospital Practices: Small Animal Clinic (2) I, II, III, Lui Laboratory—10 six-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to the procedures, protocols, techniques, and knowledge integral to working in the Small Animal Clinic of the VMTH. (SU grading only, pending completion of sequence.)

490B. Hospital Practices: Small Animal Clinic (2) I, II, III, Lui Laboratory—10 six-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine and course 490A. Continuation of 490A. (SU grading only, pending completion of sequence.)

490C. Hospital Practices: Small Animal Clinic (2) I, II, III, Lui Laboratory—10 six-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and course 490B. Continuation of 490B. (SU grading only, pending completion of sequence.)

VETERINARY MICROBIOLOGY AND IMMUNOLOGY

(School of Veterinary Medicine)

Laurel J. Gershwin, Chairperson of the Department Office, 2075 Haring Hall (916-752-1400)

Faculty

Alexander A. Ardans, D.V.M., M.S., Professor (Medicine)

Walter M. Boyce, D.V.M., Ph.D., Associate Professor
Patricia A. Conrad, D.V.M., Ph.D., Associate Professor

David A. Ferrick, Ph.D., Assistant Professor

Laurel J. Gershwin, D.V.M., Ph.D., Professor

Charlotte K. Hielman, D.V.M., Ph.D., Assistant Professor

(California Veterinary Diagnostic Laboratory)

Dwight C. Hirsh, D.V.M., Ph.D., Professor

Rance B. LeFebvre, Ph.D., Associate Professor

Jeffrey L. Stott, Ph.D., Associate Professor

Richard L. Waker, D.V.M., M.P.V.M., Ph.D., Assistant Professor (California Veterinary Diagnostic Laboratory)

Talshun Yilma, D.V.M., Ph.D., Professor

Yuan-Chung Zee, 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

John W. Osebold, D.V.M., Ph.D., Professor Emeritus

Ming Meng Wong, Ph.D., Professor Emeritus

Courses in Veterinary Microbiology and Immunology (VMI)

Upper Division Courses

126. Fundamentals of Immunology (3) I. Ferrick, Gershwin, Stott Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity and immunological diseases. Limited enrollment.

126L. Immunology Laboratory (2) I. Ferrick Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunomodulation and immune responses to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5) III. LeFebvre Lecture—3 hours, laboratory—6 hours. Prerequisite: general microbiology. Basic immunology. An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious diseases. Limited enrollment.

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, replication and assay. The mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses.

133. Introduction to Parasitology (5) III. Conrad Lecture—3 hours, laboratory—6 hours. Prerequisite: Biological Sciences 1B. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory studies supplemented with demonstrations.

198. Directed Group Study (1-5) I, II, III. The Staff (Gershwin 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

228. Molecular Biology of Animal Viruses (3) II. The Staff Lecture—3 hours. Prerequisite: course 128 or Microbiology 182 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include: virus genome structure, strategy of genome replication and transcription, and regulation of genome expression.

270. Advanced Immunology (3) II. Stott Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement, phagocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunohemistry and immunobiology. Offered in alternate years.

291. Seminar in Immunology (1) I, II, III. Gershwin Seminar—1 hour. A discussion of the current topics in immunology. (SU grading only.)
Vernary Pharmacology and Toxicology
(School of Veterinary Medicine)
Shri N. Giri, B.V.S.C., Ph.D., Chairperson of the Department
Department Office, 2165 Haring Hall (916-752-1059)

Faculty
Richard A. Becker, Ph.D., Assistant Adjunct Professor
Alan R. Buckpitt, Ph.D., Professor
Francis O. Day, D.V.M., Ph.D., Assistant Professor
(Pharmacology and Toxicology, Pharmacology and Toxicology, Veterinary Toxicology, Veterinary Toxicology)
Shri N. Giri, B.V.S.C., Ph.D., Professor
Arthur D. Jones, Ph.D., Assistant Adjunct Professor
Robert M. Joy, Ph.D., Professor
James B. Knud, Ph.D., Assistant Adjunct Professor
Michael E. Mount, D.V.M., Ph.D., Associate Professor
Sals N. Pessah, Ph.D., Associate Professor
Otto G. Raabe, Ph.D., Professor in Residence
(Veterinary Pharmacology and Toxicology, Veterinary Pharmacology and Toxicology, Veterinary Pharmacology and Toxicology, Veterinary Pharmacology and Toxicology)
Henry J. Segall, Ph.D., Professor
Philip R. Villiet, D.V.M., Ph.D., Associate Professor
(Pharmacology and Toxicology, Veterinary Pharmacology and Toxicology)

Emeriti Faculty
Gary M. Conzelman, Jr., Ph.D., Professor Emeritus

Courses in Veterinary Pharmacology and Toxicology (VPT)

Upper Division Course
198. Special Study for Advanced Undergraduates (1-3), II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses
223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine (2) III. Vullet
Lecture—1 hour; discussion—1 hour. Prerequisite: comparative or veterinary physiology and general pharmacology. Concepts of pharmacokinetics, absorption and disposition of various drugs, which are used as therapeutic agents, will be compared in different species (man and domestic animals). Course will provide background for research in clinical pharmacology.
243. Heavy Metal Toxicity and Metabolism (2) II, Raabe
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B and Physiology 101A-101B. Heavy metal toxicity and metabolism of inorganic compounds on experiment in heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions of metal-protein interactions, genetic disorders in metabolism, chelation therapy, and toxicologic carcinogenesis. Offered in alternate years.
247. Natural Toxins (2) II. Segall
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or consent of instructor. Toxicology and metabolism of natural toxins 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 toxins are discussed. Offered in alternate years.
253. Drug Metabolism (2) II. Buckpitt
Lecture—2 hours. Prerequisite: Biochemistry and Physiology 101A-101B or Pharmacology 101A-101B, consent of instructor. General pathways of drug metabolism and factors influencing the drug metabolism. Emphasis is laid upon the species, age, and genetic differences affecting the disposition of the drugs 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 studies, ion transport/process measurements, receptor sublution 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: Biochemistry and Biophysics 101L, or course 258 (may be taken concurrently). Design and practical application of receptor binding techniques including subcellular fractionation, equilibrium and kinetic ligand binding studies, receptor activation/inhibition studies, isoform of ion flux measurements, and analysis of data. Limited to 12 students. Offered in alternate years.
260. Toxicologic Pathology (3) III. Wintch, Wilson
Lecture—3 hours. Prerequisite: courses 201, 202, and 203. Provides introduction to organ system pathology; provides understanding of pathogenesis and significance of chemically induced injury in various aspects of the body. Offered in alternate years.
256. Mass Spectrometric Methods in Pharmacology and Toxicology (3) II. Jones
Lecture-discussion—3 hours. Prerequisite: Biochemistry and Biophysics 101A and Chemistry 129B or 128C. Intended to enable students in pharmacology, toxicology, and biological chemistry to evaluate and interpret mass spectrometric methods and techniques. Emphasis on identification of metabolites and biological macromolecules and quantifiable stable isotope methods.
260. Seminar (1), II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (SU grading only.)
267. Tutoring in Veterinary Pharmacology and Toxicology (1-5), 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. (SU grading only.)

Viticulture and Enology
(College of Agricultural and Environmental Sciences)
Linda F. Bisson, Ph.D., Chairperson of the Department
Department Office, 1023 Wickers Hall (916-752-0380)

Faculty
Douglas O. Adams, Ph.D., Assistant Professor
Linda F. Bisson, Ph.D., Associate Professor
Roger B. Butler, Ph.D., Professor (Viticulture and Enology, Chemical Engineering)
Mattias Hamborg, Ph.D., Assistant Professor
W. Mark Klawer, Ph.D., Assistant Professor
Mark A. Matthews, Ph.D., Associate Professor
Carole P. Meredith, Ph.D., Associate Professor
Ann C. Noble, Ph.D., Professor
Andrew Walker, Ph.D., Assistant Professor
Andrew L. Waterhouse, Ph.D., Assistant Professor
Larry E. Williams, Ph.D., Associate Professor

Emeriti Faculty
Maynard A. Amerine, Ph.D., Professor Emeritus
James A. Cook, Ph.D., Professor Emeritus
Richard E. Kepher, Ph.D., Professor Emeritus
Robert E. Kuske, Ph.D., Professor Emeritus
Lloyd A. Linder, 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
Robert J. Weaver, Ph.D., Professor Emeritus
A. Dinsmore Welb, Ph.D., Professor Emeritus

The Program of Study. Enology is a specialization under the Fermentation Science major; and viticulture is a specialization under the Plant Science and the Agricultural Systems and Environment majors.

Graduate Study. Various graduate programs 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, and Food Science.
Courses in Viticulture and Enology (VEN)

Lower Division Courses

2. Introduction to Viticulture (2) Ill. Williams
   Lecture—3 hrs. Prerequisite: course 2. The fundamental principles of biology and culture of the grapevine including: morphology, physiology, distribution, viticulture, cultivation, harvesting, and storage and processing of grapes. Successful completion of this course should prepare students for upper division courses in viticulture.

3. Introduction to Wine Making (3) I. Noble, III. Adames
   Lecture—3 hrs. Prerequisite: course 2. This broad overview of wines introduces students having a general interest (or potential fermentation science [enology] majors) to the history of wine, physiology of alcohol, wine appreciation, viticulture, fermentation, and wines produced in California and other areas of the United States and world. General education credit: Civilization and Culture.

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 hrs. 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 wine disease identification.

101B. Viticultural Practices (2) II. Kiewer, Walker
   Discussion—laboratory—4 hrs. 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 hrs. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including vineyard establishment, training, pruning, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality.

110. Grapevine Growth and Physiology (3) III. Mathews
   Lecture—3 hrs. 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.

115. Raisin and Table Grape Production (3) III. Williams
   Lecture—2 hrs. 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. Kiewer
   Lecture—3 hrs. Prerequisite: course 2. Covers growing, harvesting, and processing practices associated with wine grape production, including establishing and managing vineyards, training, trimming, winter and summer pruning, canopy management, irrigation, mineral nutrition, weed control, frost protection, crop regulation, and harvesting.

118. Grapevine Pests, Diseases and Disorders (3) III. Williams
   Lecture—3 hrs. Prerequisite: course 2. Describes the various pests and diseases of grapevines throughout California. Pest/disease identification and control methods (to include sampling techniques) will also be discussed. Integrated management approach to pest control methods will be emphasized. Offered in alternate years.

123. Analysis of Musts and Wines (3) I. Waterhouse
   Lecture—2 hrs.; laboratory—3 hrs. Prerequisite: Chemistry 5, 8A, and 8B. Open to undergraduate students in Farmer Plant Science and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles of grape juice and wine analysis, and the reasons for use of each analysis. Analysis of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biochemical methods.

124. Wine Production (3) I. Bissen
   Lecture—2 hrs.; laboratory—3 hrs. Prerequisite: course 3. Biochemistry 101A; course 123 (may be taken concurrently). Open to undergraduate students in Fermentation Science 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.

125. Wine Types and Sensory Evaluation (3) II. Noble
   Lecture—2 hrs.; laboratory—3 hrs. 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 blending processes.

127. Wine Aging: Effects and Reactions (1) I. Noble
   Lecture—3 hrs. Prerequisite: course 124. Survey of the effects of chemical, sensory effects, and management of storage and aging to the wine.

128. Wine Microbiology (4) II. Bissen
   Lecture—2 hrs.; laboratory—6 hrs. Prerequisite: courses 123, 124, courses 125, 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines. (Former course 217)

135. Wine Processing Equipment (1) I. Bissen
   Lecture—1 hr.; 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 used in processing of current equipment with grape, juice, and wines.

140. Distilled Beverage Technology (3) III. Bissen
   Lecture—3 hrs. Prerequisite: Chemistry 85; Food Science and Technology 110A. Distillation principles and processes, production of brandy, whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. Offered in alternate years.

145. Critical Evaluation of Wines of the World (1) I. Meredith
   Laboratory/discussion—2 hrs. Prerequisite: course 125, course 111 (may be taken concurrently). Critical analysis of non-California wines; several vintages of wines from specific regions will be evaluated in weekly meetings. Assigned students will provide reading for each session, with emphasis on the relationships between sensory properties of the wines and factors associated with their place of origin.

146. Fermentation Science (3) III. Ogryzdzik (Food Science and Technology)
   Lecture—3 hrs. Prerequisite: Microbiology 102, Biochemistry 101B. 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.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Internship—3-36 hrs. 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)

Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses

210. Grape Development and Composition (4) III. Adams
   Lecture—3 hrs. discussion—1 hr. Prerequisite: Botany 105, 111, 112; Biochemistry 101A, 101B recommended. Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to wine making.

216. Vineyard Establishment and Development (3) I. Kiewer
   Lecture—1 hr.; discussion—2 hrs.; fieldwork—3 hrs. Prerequisite: courses 110, 115 or 116, or consent of instructor. Applicaton of basic knowledge in viticulture, meteorology, soil, water, plant, and biological sciences to establishment and development of vineyards. To prepare a comprehensive feasibility study of suitability of a given piece of property for growing wine, raisin, or table grapes. Offered in alternate years.

219. Plant Pathology (3) II.
   Lecture—3 hrs. Prerequisite: Biochemistry 101A, 101B or the equivalent and consent of instructor. Fvionocides and other natural phenoic substances of plants; their chemistry, natural occurrence, biochemistry, relation to animal cell and relation to properties of foods and other products.

235. Winery Design and Economics (5) II. Bissen
   Lecture—2 hrs. discussion—1 hr.; studio—6 hrs. Prerequisite: course 124, 135; Food Science and Technology 110A recommended. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and styling. Project scheduling, capital costs and ten-year cash flow analysis for the winery. Grading based on design project.

   Discussion—2 hrs. Prerequisite: consent of instructor. Course covers 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. (SU grading only)

290. Seminar (1-12) III. Adams
   Seminar—1 hr. Prerequisite: consent of instructor. (SU grading only)

296C. Advanced Research Conference (1) I, II, III.
   Research Faculty
   Discussion—1 hr. 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. (SU grading only.)

291. Advances in Viticulture (1) II, Matthews. Seminar—1 hour. Prerequisite: consent of instructor. Experts in various fields of viticulture will lead discussions on recent advances in their fields of expertise. Emphasis and topics will vary from year to year and course may be repeated for credit. (SU grading only.)

292. Advances in Enology (1) III. Waterhouse. Discussion—1/2 hour, seven to ten weeks. Prerequisite: courses 123, 124, 125, 126. Discussions of previously assigned reading material, usually in the form of two or three reprints. Discussions led by faculty to acquaint students with current research interests. May be repeated for credit. (SU grading only.)

297. 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. (SU grading only.)

298. Group Study (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. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing and consent of instructor. (SU 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). For more information on Davis IGCC, call 916-752-6562.

The minor is sponsored by the Department of Sociology, 139 Young Hall.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>War-Peace Studies Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>One or two courses from the following: Anthropology 131 Comparative Literature 157 Economics 129 Philosophy 148, 117 Physics/Atmospheric Science 137 Political Science 121, 122, 123, 124, 132 Sociology 119, 157 Women’s Studies 102</td>
</tr>
</tbody>
</table>

Northern and Western Regions

One or two courses from the following:

- Geography 124
- Native American Studies 130B
- Political Science 130, 131, 136

Southern and Eastern Regions

One or two courses from the following:

- Anthropology 142, 143, 144
- Economics 170
- History 165, 190C, 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.

Faculty Adviser: John Lolland, Department of Sociology 102B Young Hall, 916-752-1580

UC Davis Washington Center

Prof. Bruce W. Jeffries, Director
UC Davis Washington Center, 1300 19th Street, NW, #300, Washington, D.C. 20036 (202-296-8221)

Information:
UC Davis Washington Center Internship and Career Center, 2nd Floor, South Hall, 916-752-7260.

The UC Davis Washington Center began operations in the 1990-91 academic year. Its central objective is to provide students and faculty new and expanded opportunities to enrich their education and research. Its principal activities are an undergraduate academic-internship program and a research program for faculty and graduate students.

Undergraduate Academic Internship Program

The UC Davis Washington Center undergraduate program is open to students from all majors in the Colleges of Letters and Science, Agricultural and Environmental Sciences, and Engineering who have completed 84 units towards graduation. Students earn a minimum of 12 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 full and spring quarters, on a 12-13 week "extended quarter" basis. It has three principal components:

- Internships/Research Projects (6-8 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, public science and culture and geared to the interests and objectives of individual students. Drawing on the internship experience, each student will develop an independent research project, under the supervision of a member of the faculty.

- Policy-Process Seminar (4 units): Each student must enroll in one or two upper division seminars. Most of these courses focus on a particular area of policy (e.g., foreign policy, science policy, economic policy, agricultural policy) and the key issues, the politics, the principal institutions, and the dynamics of the process within that policy area. Some are of more general interest, designed to draw on some of the unique historical, scientific, cultural and artistic resources of Washington. In addition to regular instruction, seminars are likely to 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 and UC Santa Barbara 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.

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.

Students also may participate in a Summer Program. The Summer Program is not open to UC Davis undergraduates and many of the same educational, cultural, historical and social activities as internships and courses or research projects. The program fee is $2,500. Some financial assistance is provided but more limited than for the academic year program.

The Washington Center also has two positions for graduate students as Graduate Fellows (combination of a predoctoral research fellowship and a teaching assistantship). More information is available from the Washington Center or Graduate Studies.

Water Science

(College of Agricultural and Environmental Sciences)

Faculty, see under the Departments of Land, Air and Water Resources; Biological and Agricultural Engineering; Civil and Environmental Engineering; Geology; Geography; and Hydrologic Sciences.

Related Major Program, See the major in Soil and Water Science.

Graduate Study. A program of study is offered leading to M.S. and Ph.D. degrees in Hydrologic Sciences. Detailed information can be obtained from the graduate advisor. Also see the Graduate Studies section in the catalog.

Graduate Advisor, M.E. Grismer and G.E. Fogg (Land, Air and Water Resources).

Courses in Water Science (WSC)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 129 Hoagland Hall (916-752-1669).

Lower Division Courses

41. Ecology of Polluted Waters (3) II. Knight Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Causes and nature of various types of pollution and their effects upon aquatic biota. Particular emphasis on biological effects of toxic compounds, inorganic compounds, suspended matter, organic matter, salts and heated water on aquatic life.

92. Water 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 water science. Internship supervised by a member of the faculty. (P/NF grading only.)

Upper Division Courses

100. Principles of Hydrologic Science (5) I. Grismer Lecture—3 hours, laboratory—1 hour. Prerequisite: Chemistry 2B, Physics 5A; Mathematics 16B recommended. Introduction to scientific principles as applied to water and water related problems. Topics include hydrology (surface and ground water), flow through porous media, water in soil-plant-atmosphere continuum, water quality, flow through pipes and channels, and representative water resource problems. General Education credit: Natural and Environmental Science.

103. Water Quality, Salt Control and Reclamation (4) I. Biggar Lecture—3 hours, laboratory—1 hour. Prerequisite: course in soil or water chemistry or consent of instructor. Water quality parameters, water analysis and salinity control in relation to soil and plant factors, reclamation of soil and disposal of waste water and their effects on receiving waters; localized and regional river basin problems in relation to salinity control and water quality.

104. Plant-Water-Soil Relationships (4) II. Hipps Lecture—3 hours; discussion—1 hour; two mid-quarter examinations to be arranged. Prerequisite: course...
100 or the equivalent preparation in elements of water in soil and plants. Soil Science 100 and one additional course in animal physiology, or consent of instructor. Principles of plant interactions with soil and water environments and their applications in crop and environmental management. Including nutrient and water uptake and transport, transpiration; soil processes affecting supplies; deficiencies and plant responses.

110. Irrigation Principles and Practices (3) III. Schwank

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 water relations, evaporation, water use, crop production, procedures for determining frequency and depth of irrigation, drainage.

122. Biology of Running Waters (3). J. Knight

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. Offered in a manner particularly suitable for students of freshwater ecology, soil and water science, and renewable natural resources.

122L. Biology of Running Waters Laboratory (2). J. Knight

Lecture—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 analyzing water and field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems.

134. Aquatic Geochemistry (3). III. Casey

Lecture—4 hours. Prerequisite: Chemistry 2; upper division students. Acid-base equilibria, metal hydrolysis and complexation, mineral solubilities, and radioisotopes to describe natural water chemistry. Intended to complement course 180: Chemistry of the Hydrosphere.

141. Hydrology (4). II. Puente

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 3B or 98, Mathematics 16B or 21B, course 101C. Study of the processes that constitute the hydrologic cycle: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff.

142. Hydraulics (3). I. Parlane

Lecture—2 hours; laboratory-discussion—3 hours. Prerequisite: Physics 1A; course 100 recommended. An introductory course for non-engineers. Physical properties of water; fluid statics; principles and equations of flow, continuity, and conservation; flow in pipes and open channels; flow measurements; and pump performance and selection.


Lecture—4 hours. Prerequisite: Engineering 103A or course 142. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Biological Systems Engineering 145.)

149A. Groundwater Hydrology (3). I. Marlowe

Lecture—3 hours. Prerequisite: Mathematics 16B and course 100; course 142 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, quality, and contamination.

149B. Groundwater Hydrology (3). II. Fogg

Lecture—3 hours. Prerequisite: course 149A or Civil and Environmental Engineering 144. Geologic, geographic, and chemical processes in contaminant transport, with emphasis on effects of aquifer complexity. Fundamentals of groundwater flow and transport modeling. Geophysical methods in groundwater.

149L. Groundwater Hydrology Laboratory (1). II. Fogg

Laboratory—3 hours. Prerequisite: course 149A or Civil and Environmental Engineering 144, course 149B concurrently. Investigation of groundwater flow and transport processes. Techniques illustrated in experiments carried out with lab apparatus, computers, or analytical models. Well-testing analysis in nonideal aquifers, computer modeling of flow and transport, and field-testing of wells.

150. Water Law and Water Institutions (3) II. The Staff


Lecture—2 hours. Prerequisite: Mathematics 16A or consent of instructor. Examination of information needed for analysis and basic procedures of production economics used for an appropriate allocation of water and related resources in agriculture. Cost minimization in production and alternative goals are considered. Offered in alternate years.

172. Farm Irrigation Management (3). III. Hopmans

Lecture—3 hours; one field trip. Prerequisite: course 104 or 110, or consent of instructor. The water budget is used as a means of orderly analysis of plant, soil, climatic, systemic, and operational factors to develop a rationale for farm irrigation practices. Plant and soil factors are emphasized.

180. Chemistry of the Hydrosphere (3). III. Tanji

Lecture—3 hours. Prerequisite: Chemistry 5 and introductory course in geology, soils, hydrology or limnology. To provide an understanding of various mechanisms and processes regulating the chemistry of natural waters. Linkage between hydrologic and geochemical cycles is stressed. Covered are chemical characteristics of rainwater and snow, streams and rivers, lakes, ground waters, estuaries, and oceans.


Internship—3-36 hours. Prerequisites: completion of 94 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.)

Graduate Courses

201. Advanced Plant-Water Relations (3). I. Heise

Lecture—3 hours; discussion sessions. Prerequisite: course 104 or Plant Science 101 or Botany 111; elementary knowledge of metabolism and rudiments of thermodynamics or concurrent enrollment in 1 unit of course 105. Water potential, chemical and component potentials of water; quantitative aspects of water transport to, within, and from plants; dynamics, regulation, and environmental factors affecting plant water status. Discuss aquatic and other characteristics associated with efficient use of water, and with xerophytism; responses to water deficiency and salinity. Offered every fourth quarter.

202. Evapotranspiration (3) III. Parlane

Lecture—3 hours. Prerequisite: Atmospheric Science 105. Radiation and energy balances of water, soil and vegetation surfaces and the effects of wind, temperature, humidity thereon.

206. Water Resource Planning and Management (3). I. Marlowe

Lecture—3 hours. Prerequisite: course 141 or the equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models.

250. Advanced Soil Physics (3). III. Nielsen

Lecture—2 hours. Prerequisite: Mathematics 228 or consent of instructor; Soil Science 107 and 207 recommended. Theoretical and applied aspects of the simultaneous transport and retention of water, solutes, heat, and gases in unsaturated soils. Miscible and immiscible displacement theories. Emphasis given to current soil physics research topics of general interest in soil, water, and engineering sciences. Offered in alternate years.

298. Group Study (1-5). I, II, III. The Staff (Chairperson in charge)

Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Water Science
(A Graduate Group)

Students admitted into the Water Science Graduate Group before June 30, 1993 will be allowed to complete their degree in this subject. New students should see the Hydrologic Sciences Graduate Group section in this catalog.

Information, K. Tanji (Land, Air, and Water Resources, 127 Vehmeyer Hall (916-752-6540).

Wildlife and Fisheries Biology
(College of Agricultural and Environmental Sciences)

Joseph J. Cech, Jr., Ph.D., Chairperson of the Department

Department Office, 1088 Academic Surge (916-752-6586)

Faculty

Daniel W. Anderson, Ph.D., Professor Louis H. Botsford, Ph.D., Professor Tim Caro, Chairperson in charge, Ph.D., Assistant Professor Joseph J. Cech, Jr., Ph.D., Professor Ronald E. Cole, B.S., Lecturer Chris DeWaele, Ph.D., Lecturer Nadine K. Jacobsen, Ph.D., Associate Professor Dale F. Lott, Ph.D., Professor Rex E. Marsh, A.B., Lecturer Peter B. Mylet, Ph.D., Professor Dirk Van Vuren, Ph.D., Assistant Professor Emeriti

Faculties

Walter E. Howard, Ph.D., Professor Emeritus Robert G. Schwab, Ph.D., Professor Emeritus

The Major Program

The wildlife and fisheries 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, emphasis in the major is placed on broad training in biological and physical sciences, with specialization in one of several areas. The major is designed primarily for students interested in eventually becoming professional ecologists in wildlife and fisheries biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable for students interested in graduate work in many areas of the biological sciences.
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 prepares students for specialized research-oriented graduate studies and achievements can be achieved in a careful planning of electives with a faculty adviser.

Career Alternatives. Positions now held by graduates in this major include wildlife, fisheries, animal control, 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 operators, and environmental consulting firms. Also, some are veterinarians, medical physicians and researchers/researchers who teach and conduct research in academic institutions.

B.S. Major Requirements:

**UNITS**

**English Composition Requirement** .............................................. 4-12 See Columba Core.

**Preparatory Subject Matter** .................................................. 47-53

Biological sciences (Biological Sciences 1A, 1B, 1C, 1D) .................................. 15

Chemistry (Chemistry 2A, 2B, and 8A) ........................................... 13

Computer science (Computer Systems and Environment I) ..................... 21

Mathematics (Mathematics 6A, 6B) ............................................. 6

Physics (Physics 1A, 1B or 5A, 5B, 5C) ........................................ 6-12

Statistics (Statistics 102 or Agricultural Science and Management 150) .... 4

**Breath/General Education** ...................................................... 6-24

Satisfaction of General Education requirement

**Depth Subject Matter** ............................................................ 49-61

Ecology (Environmental Studies 100 or Evolution and Ecology 101) ....... 3-4

Evolution (Genetics 103 or Evolution and Ecology 103) ...................... 3

Genetics (Biological Sciences 101) .............................................. 1

Physiology (Biological Sciences 102) ........................................... 1

Vertebrate anatomy (Anatomy 100 or Evolution and Ecology 105) ........... 4

Organismal biology (Organismal Biology 101) ................................ 4

[Wildlife and Fisheries Biology 110, 110L, 111, 111L, 120, 120L, or Evolution and Ecology 134, 134L] .................. 1-14

Disciplinary core (Wildlife and Fisheries Biology 122, 140, and either 121 or 130) 12

Statistics: Choose one course (two recommended) 104, 105, 108, 110 ........................................................................... 3-8

Research methods (Wildlife and Fisheries Biology 100 or 102) ............ 4-6

**Restricted Electives** ................................................................. 11-24

Choose one from the seven areas of specialization shown below.

**Unrestricted Electives** ............................................................. 6-64

Total Units for the Degree (minimum) ........................................... 180

**Areas of Specialization**

1. Behavioral ecology: Choose one course from each group:
   a. Neurobiology; Physiology and Behavior 105 or Psychology 134:
   b. Entomology 104, Environmental Studies 101 or Anthropology 154A-154B;
   c. Environmental Studies 126, Statistics 110, Wildlife and Fisheries Biology 151 or Range Science 135.

2. Conservation biology: Complete Wildlife and Fisheries Biology 154 and Evolution and Ecology 102. Choose one course from each group:
   a. Environmental studies 140, Entomology 147, Geography 173, Evolution and Ecology 135 or 147;
   b. Economics 230, Environmental Studies 161, 166 or Geography 161.
   c. Ecotoxicology and disease ecology: Complete Wildlife and Fisheries Biology 153, Chemistry 159, Biological Sciences 102, 103. Choose two courses from a and one from b or one from a and two from b:
   a. Environmental Toxicology 112A (112B recommended), 132, 138 or Water Science 41;
   b. Clinical Pathology 110, Medical Microbiology 115 or 116.

3. Fisheries biology: Complete Wildlife and Fisheries Biology 102, 120, 120L, 121, Chemistry 8B, Biological Sciences 102, 103, and:
   a. One course from Entomology 110 or Evolution and Ecology 112-112L;
   b. Two courses from Environmental Studies 116 (or 126), 151 or Water Science 122.

4. Physiological ecology: Complete Wildlife and Fisheries Biology 121 and 130, Chemistry 8B, Biological Sciences 102, 103, and:
   a. Two courses from Biological Sciences 121, Environmental Studies 129-129L or Physiology 148.
   b. Vertebrate ecology: Complete Wildlife and Fisheries Biology 121, 122, 124, and either 121 or 130.

5. Wildlife biology: Complete Wildlife and Fisheries Biology 100, 110-110L, 111-111L, 130, 151 and:
   a. Choose two courses from Botany 102 (or 198), 117, Range Science 133, 134;
   b. Choose one course from Wildlife and Fisheries Biology 131, 136 or Range Science 135.

Major Adviser. Students transferring to Davis from another institution or new students declaring their major in Wildlife and Fisheries Biology must consult the major adviser before they can be evaluated and a faculty adviser assigned.

Graduate Study. See the Graduate Study section in this catalog.

**Courses in Wildlife and Fisheries Biology (WFB)**

**Lower Division Courses**

10. Wildlife Ecology and Conservation (4) Lott, Moyle

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. Experience off campus in areas of study in the department. Internships supervised by members of the faculty. (P/N grading only.)

**Upper Division Courses**

100. Field Methods in Wildlife Biology (3) III. The Staff (Chairperson in charge)
   Lecture—10 hours total, laboratory—40 hours total (7 days). Prerequisites: course 120, 110, 111L, and 111L, and Zoology 125, or the equivalent courses, and consent of instructor. Methods for research in ecology and conservation of birds and mammals. Emphasis on study design, demography, intraspecific and interspecific interactions, activity budgets, home range, diets, and on report writing. Field work between winter and spring quarters. Limited enrollment.

102. Field Studies in Fish Biology (3) I. Moyle
   Lecture—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 monitoring and research projects on ecology, behavior, physiology or population biology of fishes. Offered in alternate years.

102L. Field Studies in Fish Biology: Laboratory (3) III. Moyle
   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 pending completion of projects.)

110. Biology and Conservation of Wild Mammals (3) III. The Staff (Chairperson in charge)
   Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C or equivalent. Biology and conservation of wild mammals. Natural history, taxonomy, geographical-environmetal distribution; anatomical-physiological-behavioral adaptations of mammals to their environment. Emphasis on research and management techniques in general.

110L. Laboratory in Biology and Conservation of Wild Mammals (3) III. The Staff (Chairperson in charge)
   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
   Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Zoology 125. 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 Management of Wild Birds (2) I. Anderson
   Laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in bird species identification, anatomy, nesting, 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. Introduction to evolution, ecology, and conservation of marine and freshwater fishes.

120L. Laboratory in Biology and Conservation of Fishes (3) 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.

122. Population Dynamics and Estimation (4) III. Botoford
   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
191. Museum Science (2) I. Cole Lecture—1 hour; laboratory—3 hours. Prerequisites: upper division standing and consent of instructor. Principles and methods required to study the mammalogy and paleontology of California, 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. Prerequisites: completion of 84 units and consent of instructor. Work experience outside of campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

193. Field and Laboratory Research (3) I, II, III. The Staff (Chairperson in charge) Laboratory—6 hours; discussion—1 hour. Prerequisites: Upper-division standing in zoology or fisheries and permission of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)

194. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

195. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Field Research in Wildlife Biology (6) Extra-credit course (Chairperson in charge) Lecture—1 hour; laboratory—40 hours; individual research projects and oral and written reports. Prerequisites: courses 140, 110, or 111-11L, Zoology 125, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology; formulation of testable hypotheses, experimental design, execution of the study, data reduction and presentation of suitable written and oral reports. Limited enrollment. Preference given to graduate students in wildlife areas of study. (S/U grading only.)

222. Advanced Population Dynamics (3) I. Botsford Lecture—3 hours. Prerequisite: graduate standing; advanced coursework in ecology (e.g., Zoology 125), 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 and evaluation of simple demographic 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.

252. Principles of Vertebrate Control (3) I. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Principles and concepts concerning the ecological, behavioral, economic, philosophical, and historical basis of vertebrate control. Offered for 1 to 3 credits; open to graduate students only. (S/U grading only.)

Women's Studies

Women's Studies

(College of Letters and Science)

Linda Morris, Ph.D. Program Director
Program Office, 27: Kerr Hall (916-752-4686)

Committee in Charge

Rosa Linda Frigo, Ph.D. (Chicana Studies, Women's Studies)
Wendy Ho, Ph.D. (Asian American Studies, Women's Studies)
Carole Joffe, Ph.D. (Sociology, Women's Studies)
Kari Lukke, Ph.D. (English, Comparative Literature)
Lila Marz, Ph.D. (Women's Studies)
Jody Meichling, Ph.D. (American Studies)
Linda A. Morris, Ph.D., ex officio (English)
Judith Newton, Ph.D. (Women's Studies)
Beinda Robnett, Ph.D. (Sociology, Women's Studies)

*Course not offered this academic year.
Women's Studies

Juliana Schiesari, Ph.D. (Italian)
Judith Stacey, Ph.D. (Sociology, Women's Studies)
Celeste Beirne (Program Assistant)

Faculty
Charlene Allan, Lecturer (Classics)
Emily Apter, Ph.D., Associate Professor (French and Italian)
Phillip Barish, Assistant Professor (English)
Cynthia L. Bransley, Ph.D., Associate Professor (History)
JoAnn Cannon, Ph.D., Professor (French and Italian)
Angie Chatburn, Ph.D., Associate Professor (Chicano Studies)
Doris Earnest, Ph.D., Lecturer (Comparative Literature)
Karen P. Erickson, Ph.D., Professor (Psychology)
Diane Ferrilee, Ph.D., Associate Professor (Sociology)
Paula Findlen, Ph.D., Professor (Anthropology)
Gail Finney, Ph.D., Professor (Comparative Literature, German)
Yvette Flores-Ortiz, Ph.D., Assistant Professor (Chicano Studies)
Mary Fong, Ph.D., Professor (Art)
Rosa Linda Fregoso, Ph.D., Assistant Professor (Chicano Studies, Women's Studies)
Zinida Gertel, Ph.D., Professor (Spanish and Classics)
Sandra Gilbert, Ph.D., Professor (English)
Gary Sue Goodman, Ph.D., Lecturer (English)
Karen Halltunen, Ph.D., Professor (History)
Ines Hernandez, Ph.D., Assistant Professor (Native American Studies)
Wendy Ho, Ph.D., Assistant Professor (Asian American Studies, Women's Studies)
Sarah B. Hrdy, Ph.D., Professor (Anthropology)
Mary Jackman, Ph.D., Professor (Sociology)
Carole Joffe, Ph.D., Professor (Sociology, Women's Studies)
Susan Joseph, Ph.D., Associate Professor (Anthropology)
Cathy Kudlick, Ph.D., Assistant Professor (History)
Anna K. Kuhn, Ph.D., Associate Professor (German)
Karl Loker, Ph.D., Associate Professor (Comparative Literature)
Dianne Sachlo Macleod, Ph.D., Associate Professor (Art History)
Martha Macri, Ph.D., Assistant Professor (Anthropology, Native American Studies)
Lata Mani, Ph.D., Assistant Professor (Women's Studies)
Susan Mann, Ph.D., Professor (History)
Sandra J. McCord, Ph.D., Associate Professor (English)
Jay Meichling, Ph.D., Professor (American Studies)
Janet Morose, Ph.D., Professor (Geography)
Patricia Moran, Ph.D., Assistant Professor (English)
Linda Morris, Ph.D., Senior Lecturer (English, Women's Studies)
Judith Newton, Ph.D., Associate Professor (Women's Studies)
Beatriz M. Ponce, Ph.D., Associate Professor (Chicano Studies)
Michele Praeger, Ph.D., Associate Professor (French and Italian)
Donna Reed, Ph.D., Lecturer (Comparative Literature)
Acta Riddell, Ph.D., Professor (Chicano Studies)
Belinda Robnett, Assistant Professor (Sociology, Women's Studies)
Irl Rogoff, Ph.D., Assistant Professor (Art Studio)
Ruth E. Rosen, Ph.D., Professor (History)
Vicki L. Ruzzi, Ph.D., Associate Professor (History)
Seth Stein, Ph.D., Professor (Comparative Literature)
Stephanie A. Sheldrake, Ph.D., Associate Professor (Psychology)
Juliana Schiesari, Ph.D., Assistant Professor (French and Italian)
Carol Smith, Ph.D., Professor (Anthropology)
Barbara Sommer, Ph.D., Lecturer (Psychology)
Judith Stacey, Ph.D., Professor (Sociology, Women's Studies)
Margot Stange, Ph.D., Assistant Professor (English)
Lenora A. Timm, Ph.D., Professor (Linguistics)
Carol Tomlinson-Keaney, Ph.D., Professor (Psychology)
Patricia Turner, Ph.D., Associate Professor (African-American Studies, American Studies)
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 and socially constructed reality that shapes the 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 UCSC is particularly rich in faculty with expertise in 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, Chicano studies, political science, psychology, sociology, Asian American studies, Native American studies, textiles and clothing, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an advisor.

Career Alternatives.
Women's Studies prepares undergraduates for a variety of careers. The B.A. degree in Women's Studies, for example, 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 the theoretical and methodological strengths in most disciplines and applied research fields. By definition, too, 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:
Plan I (Disciplinary)

Preparatory Subject Matter
Five lower division courses, including one from group a, two from group b, and two from group c...

A. From group a:
1) Four courses from Anthropology: Anthropology 130, 131, 134, 139, 158
2) Two courses from History: History 202H, 202M, 202O, 148A, 148B, 174D, 179W
3) Three courses from Literature and Language: Comparative Literature 133, 159C, English 159C, 177, 181A, 185A, 185B, 188, 189, French 141, German 129, Italian 145, Spanish 141.
4) Four courses from Sociology: Sociology 131, 132, 133, 145B.

Electives
Students within the major must bring upper-division units to a total of 44. These must be deemed appropriate for the Women's Studies major (available in the Women's Studies Office, 277 Kendall Hall, below for a partial list of options.) These courses must include:
One ethnic studies course focused on gender.
One gender-based course focused on a culture outside the U.S.
One course incorporating substantial historical material on gender prior to 1900.

Total Units for the Major, Plan I

Plan II (Thematic)

Preparatory Subject Matter
Five lower division courses, including one from group a, two from group b, and two from group c...


b) Women Outside the U.S.:

C. Cultural Representations of Women:

Electives
Students within the major must bring upper-division units to a total of 44. These must be chosen from the list of courses deemed appropriate for the Women's Studies major (available in the Women's Studies Office, 277 Kendall Hall, below for a partial list of options.) These courses must include:
One ethnic studies course focused on gender.
One gender-based course focused on a culture outside the U.S.
One course incorporating substantial historical material on gender prior to 1900.

Women's Studies 103, 104, 190.

Women's Studies 190...

Four courses from those listed as appropriate for the Women's Studies major which focus on a topic or area of inquiry approved by a Women's Studies faculty advisor (for example, women in the "Third World", women of color in the U.S., cultural representations of women, etc.)...

Women's Studies 103, 104, 190.

Women's Studies 104, 190.

Women's Studies 190.
Women's Studies Office, 277 Kerr Hall. (See below for a partial list of options.) These courses must include:

One ethnic studies course focused on gender.
One gender-based course focused on a culture outside the U.S.

One course incorporating substantial historical material on gender prior to 1900.

Total Units for the Major, Plan II: 64

Electives (Partial List)

Ethnic Studies:


Culture Outside the U.S.:


Historical Material Prior to 1900:

African-American Studies 123, Asian American Studies 112, Chicano Studies 102, Classics 15, Comparative Literature 159C, others in consultation with an adviser.

Minor Program Requirements:

UNITS

Women's Studies: 24

A. Core courses: 4

Women's Studies 20, 50, 70 or 80

B. Ethnic studies/Women's color in the U.S. (choose one): 4

African-American Studies 123, Asian American Studies 112, Chicano Studies 102, Native American Studies 180, Sociology 134, Women's Studies 195

C. Culture outside the U.S.: 4


Additional Electives from approved list of upper division cross-listed and Women's Studies courses: 12

Note: With prior consultation with an adviser, other upper division courses may be accepted toward the minor program. Under no circumstances may more than one upper division course be offered in satisfaction of requirements for the minor.

Major Adviser: See Class Schedule and Room Directory

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 ten other departments. Please see catalog listing "Feminist Theory and Research."

Courses in Women's Studies (WMS)

Lower Division Courses

20. Cultural Representations of Gender (4) I, II.

Newton, Ferguson

Lecture/discussion—4 hours. Prerequisite: one course specifically for the Women's Studies major. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms, art making, drama, literature, music, movements, and institutions.

50. Introduction to Women's Studies (4) I, II, III.

Man, Ho, Stacey

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. General Education credit: Contemporary Societies.

73. Theory and History of Sexualities (4) III.

Newton

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.

80. Special Topics in Women's Studies (4) II.

Robnett

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.

Upper Division Courses

102. Colonialism, Nationalism, and Women (4) II.

Mani

Lecture/discussion—4 hours. Prerequisite: one course specifically for the Women's Studies major. Explores key dimensions of women's relationships to colonialism and nationalism in one or more societies.

103. Introduction to Feminist Theory (4) I, II.

Mani

Lecture/discussion—4 hours. Prerequisite: one course specifically for the Women's Studies major. Introduces 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.

Newton

Lecture/discussion—4 hours. Prerequisite: one course specifically for the Women's Studies major. Feminist applications and transformations of traditional disciplinary practices; current issues and methodologies in feminist interdisciplinary work.

117. Gender and Social Policy (4) III.

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.

190. Senior Seminar (4) II.

Joffe

Lecture—4 hours. Prerequisite: Women's Studies senior status. Capstone course for senior Women's Studies majors, which focuses on current issues in feminism as they impact on theory, public policy, and practice.

192. Internship in Women's Studies (1-12) I, II, III.

The Staff

Internship—3-36 hours written report. Prerequisite: completion of a minimum of 54 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, women's center, affirmative action office, advertising agency, or various social work agencies. Final written report on internship experience. (P/NP grading only.)

195. Thematic Seminar in Women's Studies (4) I, II, III.

The Staff

Seminar—4 hours. Prerequisite: two courses specifically 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. Enrollment limited.

197T. Tutoring in Women's Studies (1-12) I, II, III.

The Staff (Director in charge)

Tutoring—3-12 hours. Prerequisite: upper division standing; completion of course to be tutored with grades of A or better. 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, leading discussion groups. (P/NP grading only.)

Zoology

See Biological Sciences: Section of Evolution and Ecology

Courses in Zoology (ZOO)

Questions pertaining to the following courses should be directed to the master adviser, or Section of Evolution and Ecology, 2320 Storer Hall.

Upper Division Courses

121A. Cell Biology (4) I, II.

Nuccio

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biochemistry (may be taken concurrently). An introduction to modern cell biology with emphasis on cell structure, membranes and organelles, the cytoskeleton, and bioenergetics. Last offering: fall quarter 1993. This course will be canceled and replaced by Biological Sciences 104.


Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 88 or 128C, introductory course in biochemistry strongly recommended. A survey of cell biology presenting the structure and function of the major cell organelles. Topics discussed include general cell structure, membranes, bioenergetics, mobility, cell synthesis, and cell division. Not open to students who have received credit for Zoology 121A or 121B. (Same course as Botany 130.) Last offering: fall quarter 1993. This course will be canceled and replaced by Biological Sciences 104.
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 indicators 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 indicators 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, you are considered to be 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 requirements.

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) is a resident of California who left that state within one year of the resident determination date if: 1) you remained in California after your parent(s) departed; 2) you enroll in a California public or postsecondary institution within one year of your parent(s) departure; and 3) once enrolled, you maintain continuous attendance in that institution.

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 resident 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 have lived continuously with an adult who is not your parent for at least two years prior to the resident 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 resident 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 pur-
poses 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. You must petition for a waiver of the nonresident tuition fee each term you are eligible. 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 enrols 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 that presumption. (An applicant 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.

Classification to Resident Status
All changes of status must be initiated prior to the first day of class 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 or Assistant Residence Deputy, Office of the Registrar, 128 Mac Hall, Davis, California 95616, (916) 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 exposition of the law regarding residence. Please note that changes may be made in the residence requirement between the publication of this statement and the resident 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, 300 Lakeside Dr., 7th Floor, Oakland, CA 94612-3565) 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 compliance with Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, the Age Discrimination in Employment Act of 1967, and the Age Discrimination Act of 1975, does not discriminate on the basis of race, color, national origin, religion, sex, disability, or age in any of its policies, procedures, or practices; nor does the University, in compliance with Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, and Section 12940 of the State of California Government Code, discriminate against any employees or applicants for employment because they are special disabled veterans or veterans of the Vietnam era, or because of their medical condition (cancer-related) as defined in Section 12926 of the California Government Code, their ancestry, or their marital status; nor does the University discriminate on the basis of citizenship, within the limits imposed by law or University policy; nor does the University discriminate on the basis of sexual orientation. This nondiscrimination policy covers admission,
access, and treatment in University programs and activities, and application for and treatment in University employment.

In conformance with University policy and pursuant to Executive Orders 11246 and 11375, Section 503 of the Rehabilitation Act of 1973, Title I of the Americans with Disabilities Act of 1990, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, the University of California is an affirmative action/equal opportunity employer.

Inquiries regarding the University’s equal opportunity/affirmative action policies may be directed to the Affirmative Action Compliance Officer, Deanna E. Feige, 533 Mrak Hall, 916-752-2412. Speech and hearing impaired persons may dial 916-752-7320 (TDD).

Sexual Harassment. Sexual harassment of students, staff, or faculty members is prohibited by law and by University regulation. Sexual harassment is unacceptable and will not be condoned on the UCD campus. The campus community will take all necessary and appropriate steps to protect students, staff, and faculty from sexual harassment and all forms of sexual intimidation and exploitation. The Sexual Harassment Education Program (752-2255) provides information and assists students 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, or the Office of Student Judicial Affairs. 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 records pertaining to themselves in their capacity as students;
- To have withheld from disclosure, absent their prior consent for release, personally identifiable information from their student records, with exceptions as noted in Section 10.70 of the University’s policies;
- To inspect records maintained by the campus of disclosure of personally identifiable information from their student records;
- To seek correction of their student records through a request to amend the records or a request for a hearing; and
- To file complaints with the Department of Education regarding alleged violations of the rights accorded them by the Federal Act.

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, telephone 916-752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual, Section 320-21, may be consulted at the Reference Desk of the Shields Library. Copies of the UC policies may be obtained at the Office of Student Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address (campus and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, degrees and honors received, the most recent educational institution attended, participation in officially recognized activities, including intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams provided, however, that address and telephone numbers are not public information with respect to interns, residents and fellows and that with respect to these students, public information also includes primary hospital assignment, field of residency training, and name of medical school awarding the M.D. degree.

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.

Students may request in writing by the last day of registration that their addresses 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.

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. 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 cannot be verified for potential employers without the student’s written consent. Finally any degrees earned and the dates they were conferred may not be confirmed for any third party in connection with the appointment of that graduate to a new position or published in connection with an honor that individual subsequently receives. Students may reverse the decision to withhold their address and phone number at registration for a new quarter on the Student Address Form. The decision to withhold address and phone number or all information can be reversed at any time by filing a form with the Office of the Registrar.

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.

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, an institutional accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education. UC Davis is also accredited by the Association of American Law Schools, American Bar Association, Association of American Medical Colleges, 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, 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, 19 are prominent 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. Jack W. Peltason 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

Pee Wilson  
Governor of California and President of The Regents
Leo T. McCarthy  
Lieutenant Governor of California
Willie L. Brown, Jr.  
Speaker of the Assembly
Paul J. Hail  
President of the Alumni Associations of the University of California
Carl J. Stoney, Jr.  
Vice President of the Alumni Associations of the University of California
Jack W. Peltason  
President of the University
Robert E. Murphy  
Roy L. Shults

Appointed Regents

(Current term expires on March 1 of year indicated)

William T. Bagley  (2002)
Roy T. Brophy  (1998)
Clair W. Burgener  (2000)
Glenn Campbell  (1996)
Frank W. Clark, Jr.  (2000)
Ward Connerly  (2005)
John Davies  (2004)
Tirso del Junco, M.D.  (1997)
Alice J. Gonzales  (1998)
S. Sue Johnson  (2002)
Meredith J. Khachigian  (2001)
Leo S. Kolligian  (1997)
Howard H. Leach  (2001)
Lester H. Lee  (2005)
Dean A. Watkins  (1996)
Harold M. Williams  (1994)
Jacques S. Yeager  (1994)

Student Regent  
Darby Morrisroe  (June 30, 1994)

Faculty Representatives

W. Elliot Brownlee  
Arnold Binder

Principal Officers of The Regents

James E. Holst  
General Counsel and Vice President—Legal Affairs
Herbert M. Gordon  
Treasurer
Bonnie M. Smotony  
Secretary

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Jack W. Peltason  
President of the University
Walter E. Massey  
Senior Vice President—Academic Affairs and Provost
William B. Baker  
Vice President—University and External Relations
Cornelius L. Hopper, M.D.  
Vice President—Health Affairs
Kenneth R. Farrell  
Vice President—Agriculture and Natural Resources
James E. Holst  
General Counsel and Vice President—Legal Affairs

UNIVERSITY CHANCELLORS

Chang-Lin Tien  
Chancellor at Berkeley
Theodore L. Hullar  
Chancellor at Davis
Laurel L. Wilkening  
Chancellor at Irvine
Charles E. Young  
Chancellor at Los Angeles
Raymond L. Orbach  
Chancellor at Riverside
Richard C. Atkinson  
Chancellor at San Diego
Julius R. Krevans, M.D.  
Chancellor at San Francisco
Barbara S. Uehling  
Chancellor at Santa Barbara
Karl S. Pister  
Chancellor at Santa Cruz

ADMINISTRATIVE OFFICERS—DAVIS

Chancellor  
Theodore L. Hullar, Ph.D.

Chancellor Emeritus  
James H. Meyer, Ph.D.

Vice Chancellors

Larry N. Vanderhoeft, Ph.D.  
Executive Vice Chancellor and Provost
Janet C. Hamilton, B.S.  
Vice Chancellor—Administration
Richard E. Matheny, Ed.D.  
Vice Chancellor—University Relations
Darrell P. Ralls, A.B.  
Vice Chancellor—Facilities
Frank L. Rincon, Ph.D.  
Vice Chancellor—Student Affairs
Robert N. Shelton, Ph.D.  
Vice Chancellor—Research
Vice Provosts

Vice Provost—Academic Programs and Dean—Undergraduate Studies
Carol Tomlinson-Keasey, Ph.D.
Vice Provost—Faculty Relations

Assistant Chancellor
Sally P. Springer, Ph.D.

Associate/Assistant Vice Chancellors
Carole A. Barone, Ph.D.
Associate Vice Chancellor—Information Technology
Trevor L. Chandler, Ph.D.
Associate Vice Chancellor—Campus Diversity
Robert E. Chason, M.Ed.
Associate Vice Chancellor—Student Affairs (Business Management and Operations)
Richard P. Dominguez, M.B.A.
Associate Vice Chancellor—Business Affairs
Anthony B. Flores, M.P.A.
Assistant Vice Chancellor—Finance, Accounting Officer
Robert G. Frank, Ph.D., J.D.
Assistant Vice Chancellor—Student Affairs (Student Relations)
Gerald R. Halsey, M.P.A.
Assistant Vice Chancellor—Offices of Chancellor/Provost
Gina Kelsch, B.A.
Associate Vice Chancellor—University Relations
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
Dennis W. Shimek, B.S.
Associate Vice Chancellor—Employee Relations and Staff Affairs

University Librarian
Marilyn J. Sharrow, M.A.L.S.

Registrar
Evelyn R. Babey, Ph.D.

Directors
Roger D. Anderson, Ed.D.
Director of Relations with Schools/EOP Outreach Services
Donna Blakemore, B.A.
Executive Director, Cal Aggie Alumni Association
Barbara A. Clemmons, M.S.
Director of Special Projects—University Relations
Dorothy G. Crocker, B.A.
Director of Sponsored Programs
Marjorie M. Dickinson, A.B.
Director of Government and Community Relations
Stan Nosek, M.S.
Director of Event Management and Administrative Services
Maril R. Stratton, M.A.
Director of Public Communications
Dennis F. Pendleton, Ph.D.
Director of Public Service Research Dissemination Program
Gary Tudor, Ed.D.
Director of Undergraduate Admissions

Steven H. Weiss, M.B.A.
Director of University Cultural Programs
William C. Waid, B.S., M.H.A.
Director of Cowell Student Health Center

College of Agricultural and Environmental Sciences
Robert B. Fridley, Ph.D., Executive Associate Dean
Susan Kaiser, Ph.D., Associate Dean
Andre Lauchli, Ph.D., Associate Dean
Michael S. Reid, Ph.D., Associate Dean
Robert K. Washino, Ph.D., Associate Dean

College of Engineering
Mohammed S. Ghausi, Ph.D., Dean
Benjamin J. McCoy, Ph.D., Associate Dean
Zuhair A. Munir, Ph.D., Associate Dean
James F. Shackelford, Ph.D., Associate Dean

College of Letters and Science
Robert O. Crummey, Ph.D., Dean
Albert A. Harrison, Ph.D., Executive Associate Dean
William M. Jackson, Ph.D., Associate Dean
George G. Roussas, Ph.D., Associate Dean (Division of Statistics)
Carolyn F. Wall, Ph.D., Associate Dean
Fred E. Wood, Ph.D., Associate Dean

Division of Biological Sciences (Intercollege)
Robert D. Grey, Ph.D., Dean
Menna R. Villarejo, Ph.D., Associate Dean
Ronald J. Baskin, Ph.D., Associate Dean

Graduate School of Management
Robert H. Smiley, Ph.D., Dean
Richard P. Castelias, Ph.D., Associate Dean

School of Law
Bruce A. Wolk, J.D., Dean
Rex R. Perschbacher, J.D., Associate Dean

School of Medicine
Gerald S. Lazarus, M.D., Dean
James J. Castles, M.D., Executive Associate Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Loge, M.B.A., Associate Dean
Donal A. Walsh, Ph.D., Associate Dean

School of Veterinary Medicine
Frederick A. Murphy, D.V.M., Ph.D., Dean
George H. Carden III, D.V.M., Ph.D., Associate Dean
Robert J. Hansen, Ph.D., Associate Dean
Donald G. Low, D.V.M., Ph.D., Associate Dean
Bennie I. Osburn, D.V.M., Ph.D., Associate Dean

Graduate Studies
M.R.C. Greenwood, Ph.D., Dean
Donald L. Curry, Ph.D., Executive Associate Dean
Ray L. Rodriguez, Ph.D., Acting Associate Dean
Jon C. Wagner, Ph.D., Acting Associate Dean (Division of Education)

University Extension
Charles A. Lacy, Ph.D., Interim Dean
PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE

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.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>79</td>
<td>76</td>
<td>82</td>
<td>94</td>
<td>81</td>
<td>100</td>
<td>66</td>
<td>77</td>
<td>91</td>
<td>56</td>
<td>71</td>
<td>80</td>
<td>90</td>
<td>69</td>
<td>75</td>
</tr>
<tr>
<td>(Percentage finding work in field of choice)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: A 1991 survey of 1989-90 graduates conducted by Student Affairs Research and Information, UC Davis.

RETENTION DATA AND GRADUATION RATES AT UC DAVIS

Freshmen

(Retention and graduation rates through Fall 1992 for all undergraduates entering UC Davis from high school.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 12 Quarters</th>
<th>*Percent Graduating in 15 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>2,511</td>
<td>91%</td>
<td>37%</td>
<td>71%</td>
</tr>
<tr>
<td>1983</td>
<td>2,434</td>
<td>92%</td>
<td>31%</td>
<td>70%</td>
</tr>
<tr>
<td>1984</td>
<td>3,010</td>
<td>93%</td>
<td>28%</td>
<td>71%</td>
</tr>
<tr>
<td>1985</td>
<td>2,719</td>
<td>91%</td>
<td>29%</td>
<td>67%</td>
</tr>
<tr>
<td>1986</td>
<td>2,475</td>
<td>90%</td>
<td>28%</td>
<td>71%</td>
</tr>
<tr>
<td>1987</td>
<td>3,337</td>
<td>93%</td>
<td>28%</td>
<td>68%</td>
</tr>
</tbody>
</table>

Transfer Students

(Retention and graduation rates through Fall 1992 for all undergraduates transferring to UC Davis as juniors.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 6 Quarters</th>
<th>*Percent Graduating in 9 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>616</td>
<td>89%</td>
<td>35%</td>
<td>72%</td>
</tr>
<tr>
<td>1984</td>
<td>704</td>
<td>89%</td>
<td>35%</td>
<td>72%</td>
</tr>
<tr>
<td>1985</td>
<td>631</td>
<td>90%</td>
<td>35%</td>
<td>72%</td>
</tr>
<tr>
<td>1986</td>
<td>599</td>
<td>91%</td>
<td>33%</td>
<td>76%</td>
</tr>
<tr>
<td>1987</td>
<td>683</td>
<td>91%</td>
<td>28%</td>
<td>74%</td>
</tr>
<tr>
<td>1988</td>
<td>776</td>
<td>91%</td>
<td>29%</td>
<td>74%</td>
</tr>
<tr>
<td>1989</td>
<td>888</td>
<td>92%</td>
<td>29%</td>
<td>68%</td>
</tr>
</tbody>
</table>

*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.)

Source: Student Affairs Research and Information, UC Davis (March 1993).

AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR’S, MASTER’S, AND DOCTORATE DEGREES

<table>
<thead>
<tr>
<th>Field of Study:</th>
<th>Bachelor’s</th>
<th>Average Monthly Salary</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$2807</td>
<td>$3162</td>
<td>$4358</td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
<td>$1823</td>
<td>$2049</td>
<td>$2616</td>
</tr>
<tr>
<td>Health Sciences/Life Sciences</td>
<td>$2284</td>
<td>$2187</td>
<td></td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>$2296</td>
<td>$2936</td>
<td>$4018</td>
</tr>
</tbody>
</table>

Source: 1992 National Salary Survey data provided by the College Placement Council.
Agricultural Practices (see Applied Biological Systems Technology)
Agricultural Systems and Environment, 109–111
Agronomy, 111–112
Agronomy and Range Science, 112–113
(see also Range Science)
Allergy (see Rheumatology-Allergy)
Alumni Association, 44
American History and Institutions requirement, 68–69
American Studies, 113–114
Anatomy (see Cell Biology and Human Anatomy; Veterinary Anatomy and Cell Biology)
Anesthesiology, 298–299
Animal Behavior (A Graduate Group), 114
Animal Genetics, 114–115
Animal Nutrition (see Nutrition)
Animal Science, 115–117
Animal Science and Management, 117–118
Animal Surgery Laboratory, 17
Anthropology, 118–122
Application filing and fees, 21
Applied Behavioral Sciences, 122–124
Applied Biological Systems Technology, 134–135 (under Biological and Agricultural Engineering)
Applied Mathematics (A Graduate Group), 124–125
Applied Physics (see Physics)
Applied Science Engineering, 201–203
Aquaculture (see Applied Biological Systems Technology; Animal Science; Wildlife and Fisheries Biology)
Arboretum, University, 15
Archaeology (see Anthropology)
Architecture (see Art History; Landscape Architecture)
Area requirement, 80–81
Art History, 125–127
Art Studio, 127–128
Arts at Davis, 41–42
Asian American Studies, 129
Asians (see Asian American Studies; East Asian Studies)
Associated Students (ASUCD), 42–43
Astronomy, 335
ASUCD, 42–43
Athletics, 41 (see also Physical Education)
Atmospheric Science, 129–131
Atmospheric Science (A Graduate Group), 131
Avian Medicine (see Epidemiology and Preventive Medicine)
Avian Sciences, 131–133
Avian Sciences (A Graduate Group), 133
Bachelor’s degree requirements, 68
second baccalaureate, 29
Bacteriology (see Biological Sciences: Section of Microbiology)
Basement Gallery, 42
Bicycles, 10, 31, 51
Biochemistry, 133, 137 (see Biological Sciences: Section of Molecular and Cellular Biology)
Biochemistry and Biophysics, 133
Biochemistry and Molecular Biology (A Graduate Group), 133
Biochemistry and Special Instrumentation Laboratory, 17
Biological and Agricultural Engineering, 133–135, 192, 194–195, 203–205
Biological Chemistry, 299
Biological Sciences, 48, 135–157
concordance, 150–157
courses, 140–141
Sections of, 141–149
Biological Systems Engineering, 192, 194, 203–205
Biomedical Engineering (A Graduate Group), 149
Biophysics (A Graduate Group), 158
Bodega Marine Laboratory, 16–17, 140
Bodega Marine Reserve, 16–17
Botany, 158 (see also Biological Sciences: Section of Plant Biology; and Plant Biology)
Botany (A Graduate Group), 158
Buses, 39
Cal Aggie Marching Band, 44
Calendar, 5 (academic), 91 (Law), 97 (Medicine), 101 (Veterinary Medicine)
California Agricultural Experiment Station, 15
California Regional Primate Research Center, 17
Campus tours, 12
Candidacy, filing for, 5, 69
Cantonese, 129
(see also Asian American Studies)
Cardiology, 304
Career Planning and Placement (see Internship and Career Center)
Carriage unit, 57
Carpooling, 39
Cell and Developmental Biology (A Graduate Group), 158
Cell Biology and Human Anatomy, 299–300
Certificate program for engineers, 86–87
Certification of full-time status, 66
Chancellors, 398–399
Chancellor’s Administrative Advisory Committees, 43
Chemical Engineering, 192, 195–196, 205–207
Chemistry, 159–162
(see also Agricultural and Environmental Chemistry)
Chicana/Chicano Studies, 162–163
Child Care Programs, 38–39
Child Development (A Graduate Group), 163 (see also Human Development)
Chinese and Japanese, 164–167
(see also Asian American Studies; East Asian Studies)
Civil and Environmental Engineering, 192–193, 196–197, 207–211
Class level, 55
Classics, 167–169
Clinical Nutrition and Metabolism, 304
Clinical Pathology, 169
Clinical Psychology, 300
Communication (see Rhetoric and Communication)
Community Development (A Graduate Group), 169 (see also Applied Behavioral Sciences)
Community and International Health, 300–301
Community Housing Office, 37
Community Nutrition, 169–170
Comparative Literature, 170–173
Comparative Literature (A Graduate Group), 173
Comparative Pathology (A Graduate Group), 173
Computer Science (A Graduate Group), 173–174
Concurrent credit, 57
Concurrent enrollment, 28
Consumer Economics, 174
Consumer Science, 174
Consumer Technology (see Applied Biological Systems Technology)
Counselling (see Advising)
Counselling Center, 50
Courses
adding and dropping, 56
alternate year designation, 103
classification and numbering, 55–56
credit for (units), 57
expanded descriptions, 103
grading, 61–63
load, 56
prerequisites, 56
registering for, 55
repetition of, 62–63
Craft Center, 40
Credit by examination, 57
Critical Theory, 174
Crocker Nuclear Laboratory, 18
Cultural Days, 44

Dance (see Physical Education)
Davis, campus and community, 10–12
Degree check, 78, 82
Degree requirement changes, 74, 78, 82
Degree requirements
Agricultural and Environmental Sciences, College of, 74
Engineering, College of, 75–78
Graduate Division, 85–86
Letters and Science, College of, 79–82
Veterinary Medicine, School of, 100–101
Degrees offered by UC Davis, 6–7
Dermatology, 301
Designated Emphasis, 86
Design, 175–176
(see also Art; Landscape Architecture)
Dietetics, 176–177
Disability Resource Center, 51–52
Disclosures from student records, 396–397
Discrimination/Harassment, 50, 396–397
Discrimination, University policy prohibiting, 396
Dismissal, 65–66
Disqualification, 65–66
Dorms, 37
Draft information, 52
Dramatic Art, 42, 177–179
Dropping courses, 56

Early Childhood Laboratory, 19, 39
Earth Sciences and Resources (A Graduate Group), 179
East Asian Studies, 179–180
Ecology (A Graduate Group), 180–181
Ecology, Institute of, 15
Economics, 181–184
(see also Agricultural Economics; Consumer Economics)
Economy, Justice, and Society, 184–185
Education, 185–188
(see also Agricultural Education; Applied Behavioral Sciences; Human Development)
Education (A Graduate Group), 188
Education, Master of, graduate group, 290
Education Abroad Program, 188–191
Education and Graduate Placement Services, 53
Educational Opportunity Program (EOP), 28, 33, 49, 50
Electrical and Computer Science Engineering, 193, 197–198, 211–218
Emergency Medicine, 304–305
Employment, student, 35, 39
Endocrinology and Metabolism, 305
Endocrinology (A Graduate Group), 191–192
Engineering, College of, 13–14, 192–223
Aeronautical Science and, 193–194, 218–221
Applied Science, 201–203
Biological and Agricultural, 192, 194–195, 203–205
Chemical, 192, 195–196, 205–207
Civil and Environmental, 192–193, 196–197, 207–211
Computer Science, 193, 197–198, 215–218
Electrical and Computer Science, 193, 197–198, 211–218
Materials Science and, 193, 197, 196–199, 200, 218, 221–223
Mechanical, 193, 199–200, 218–220
Engineering design requirement, 76
Engineering electives, 76–78
English, 223–227
English composition examination, 74, 76, 80
English composition requirement, 74, 76, 80
English proficiency requirement, 22, 85
Enology (Viticulture and Enology), 386–388
Entomology, 227–229
Environmental and Resource Sciences, 229–230
Environmental Biology and Management, 231
Environmental Design, 232
Environmental Geology, 232
Environmental Horticulture, 232–233
Environmental Planning and Management (see Environmental Biology and Management; Environmental Horticulture)
Environmental Policy Analysis and Planning, 233–234
Environmental Studies, 234–236
Environmental Toxicology, 236–238
EOP/SAA, 28, 33, 49, 50
Epidemiology (A Graduate Group), 238
Epidemiology and Preventive Medicine, 238–240
Equestrian Center, 40
Evolution and Ecology (see Biological Sciences), 141–142
Examinations
Advanced Placement, 24–25
credit by, 57
final, 60–61
High School Proficiency, 24
midterm, 60
requirement (ACT and SAT), 23–24
Expenses
annual, 31
housing, 37
international student, 31–32
Exploratory program, 47
Extension courses (see University Extension)

Facility for Advanced Instrumentation, 18
Family Practice, 301–302
Fee
employee-student, 31
exceptions, 31
refunds, 32
Fees and expenses, 31–32
Fellowships, 86
Feminist Theory and Research, 240
Fermentation Science, 240
Fiber and Polymer Science, 241
Financial aid, 32–35, 38
Fine Arts Collection, 42
First Resort, The, 46–49
Fisheries (see Animal Science; Wildlife and Fisheries Biology)
Floriculture (see Plant Science major)
Food Biochemistry, 241–242
Food Engineering, 192, 194–195
Food Intake Laboratory, 17
Food Science, 242–243
Food Science (A Graduate Group), 243
Food Science and Technology, 243–245
Food Service Management, 245–246
Footnotes, key to symbols, 103
Foreign language requirement, 81
Foreign student (see International student)
Forest Engineering, 194
French, 246–248
Freshman Seminar Program, 248–249

Galleries, art, 40, 42
Games Area, 40
Gastroenterology, 305
General Education Requirement, 68, 69–73, 74 (Agricultural and Environmental Sciences), 77 (Engineering), 80–81 (Letters and Science)
General Education courses for 1993–94, 73
General Medicine, 305
Genetics (see Biological Sciences), 137–138
Genetics (A Graduate Group), 249
Geography, 249–252
Geology, 252–256
Geophysics, 256
Geotechnical Modeling, Center for, 18
German, 256–261
Gorman Museum, 42
Governmental Affairs, Institute of, 19
Grade point average (GPA), 61
Grades, 61–63
change of, 50, 62
finals, 63
incomplete, 62
in-progress, 62
Passed/Not Passed, 61–62
repeated course, 62–63
Satisfactory/Unsatisfactory, 62
Graduate admission, 84–85
advising, 49
certificate program for engineers, 86–87
deadlines, 84
degrees, 6–7, 85–86
Studies, 83–87
fees and expenses, 31
placement services, 53
program of study, 85–86
Student Association, 43
Graduates, proportion finding work in their field of study, 400
Graduation
filling for, 5, 69
honors, 63–64
rates, 400
Grants, 33
Greek (see Classics), 167–168
Grievances, resolving, 50
GSA, 43

Handicapped Students, services to, (see Disability Resource Center)
Health
education, 51
insurance, 31, 32, 38
Sciences Advising Office, 49
services, 37–38, 51
Health Sciences Research Labs, 17
Hebrew (see also Religious Studies), 358
Hematology-Oncology, 305
Herbarium, J.M. Tucker, 15
high school proficiency examination, 24
History, 261–266
History and Philosophy of Science, 266–267
Honorary societies, 64
Honors and Prizes, 63–64
Horticulture (A Graduate Group), 267
(see also Environmental Horticulture)
Housin, The, 51
Housing, 37
Human Anatomy (see Cell Biology and Human Anatomy)
Human Corps Program, 53
Human Development, 267–269
Human Performance Laboratory, 17
Human Physiology, 302–303
Humanities, 269
Humanities Institute, 19
Hydrological Sciences (A Graduate Group), 269–270

Immunology (A Graduate Group), 270
(see also Veterinary Microbiology and Immunology)
Incomplete grades, 62
Independent Study Program, 271
Individual major, 59, 70, 271
Infectious Diseases, 305–306
Information Technology, 15
In-Progress grading, 62
Integrated Studies Program, 271–272
Intercampus exchange program, 86
Intercampus Institute for Research at Particle Accelerators, 18
Intercollegiate athletics, 41
Internal Medicine, 303–304
International Agricultural Development, 272–273
International Agricultural Development (A Graduate Group), 273–274
International Relations Program, 274–275
International student admission, undergraduate, 26–27
graduate admission to Study, 85
expenses, 31–32
Services, 51
Internship and Career Center, 53
Internship Program, 53, 275
Intramural and club sports, 41
Irrigation (see Engineering: Civil and Environmental; Soil and Water Science)
Italian, 275–277

Japanese, 164–167
Jepson Prairie Reserve, 16
Judicial Affairs, 42, 44, 50

Land, Air and Water Resources, 277
Landscape Architecture, 277–279
LaRue Park Children’s House, 39
Latin (see Classics), 167–169
Law School Admission Test (LSAT), 89–90
Law, School of, 89–91, 279–284
Learning Skills Center, 49
Learning Resources Center, 50
Leave of absence, 64–65
Letters and Science, College of, 14–15
Library, University, 14–15
Linguistics, 284–286
Linguistics (A Graduate Group), 287
Literature in Translation, 287–288
Living accommodations, 37
Loans, 33–34, 86
Majors
change of, 58
cross-college, 59
declaration of, 57–58
degree certification, 69, 74
double, 70
individual, 59, 70
list of, 6–7
multiple, 58–59
Management, Graduate School of, 93, 286–290
Marine Laboratory, 16
Marine Resources, Institute of, 18
Master of Education (A Graduate Group), 290
Master of Preventive Veterinary Medicine, 100, 353
Materials Science and Engineering, 193, 197, 198–199, 200, 216, 221–223
Mathematics, 290–294
Mechanical Engineering, 193, 199–200, 216–220
Medical Microbiology, 307
Medical Pharmacology and Toxicology, 307–308
Medical Sciences, 298
Medicine, Department of (Veterinary Medicine), 314–315
Medicine, School of, 94–97, 294–314
Medieval Studies, 315–316
Memorial Union, 40
Memorial Union Art Gallery, 40, 42
Mexican-American (Chicano) Studies (see Chicana/Chicano Studies)
Microbiology (see Biological Sciences), 138, 143–144
(see also Medical Microbiology; Veterinary Microbiology and Immunology)
Microbiology (A Graduate Group), 316
Military Science, 316–318
Minimum progress, 56, 65–66
Minor programs, 59, 70
Molecular and Cellular Biology (see Biological Sciences), 144–146
Music, 41, 318–321

Name change, 55
Native American Studies, 321–323
Nature and Culture, 323
Nelson Gallery, 42
Nematology, 323–324
Nephrology, 306
Neurobiology (A Graduate Group), 324
Neurobiology, Physiology and Behavior (see Biological Sciences), 146–148
Neurology, 308–309
Neurosurgery, 309
Nondiscrimination, 396–397
Nuclear Magnetic Resonance Facility, 18–19
Nutrition, 324–326
Nutrition (A Graduate Group), 326
Nutrition (Medicine, see Clinical Nutrition and Metabolism)
Nutrition Science, 326–327
Obstetrics and Gynecology, 309
Occupational and Environmental Health, 306
Ophthalmology, 309–310
Organizational Studies, 366
Orientation, 47, 49, 327
Orthopaedic Surgery, 310
Otolaryngology, 310–311
Outdoor Adventures, 40
Parking Services, 39
Part-time status, 56–57
Passed/Not Passed grading, 61–62
Pathology (Medicine), 311
Pathology (Veterinary Medicine), 327
Pediatrics, 311–312
PELP, 64–65
Perfect Tender, The, 39
Pharmacology (see Medical Pharmacology and Toxicology; Veterinary Pharmacology and Toxicology)
Pharmacology and Toxicology (A Graduate Group), 328
Philosophy, 328–331
Physical Education, 331–334
Physical Medicine and Rehabilitation, 312
Physics, 334–338
Physiological Sciences, 336
Physiology, 138, 339
(see also Biological Sciences: Section of Neurobiology, Physiology and Behavior; Human Physiology; Plant Physiology)
Physiology (A Graduate Group), 337–340
Planned Educational Leave Program, 64–65
Plant Biology (see Biological Sciences: Section of Plant Biology; and Plant Biology), 138–139, 188–194, 340–342
Plant Biology (A Graduate Group), 342–343
Plant Pathology, 343–344
Plant Physiology (A Graduate Group), 344
(see also Plant Biology)
Plant Protection and Pest Management (A Graduate Group), 344
Plant Science, 345–346
Plastic Surgery, 312
Political Science, 347–351
Pomology, 351–352
Population Biology (A Graduate Group), 352–353
Preventive Veterinary Medicine (A Graduate Group), 353
Primate Research Center, California Regional, 17
Principles of Community, 11
Privacy Act, 397
Probation, 65–66
Proficiency examination, high school, 24
Protein Structure Laboratory, 17
Psychiatry, 312–313
Psychology, 353–356
Pulmonary Medicine, 306
Pulaski Creek Campus Reserve, 16
Pulaski Creek Lodge, 40
Quarters
explatory note, 103
how to convert units, 57
Radiation Oncology, 313
Radiological Sciences, 356–357
Radiology
Diagnostic, 313
Nuclear Medicine, 313
Range and Wildlands Science, 357
Range Science, 357–358
Rape Prevention Education Program, 52
Readmission
after an absence, 28
in graduate standing, 85
(see also Reentry Student Services)
Rec Pool Lodge, 40
Records, disclosures from, 397
Recitation Hall, 40–41
Recreation Swimming Pool, 40
Recreational facilities and programs, 39–42
Reentry Student Services, 52
Refunds, fees, 32
Regents, 398
Register, Statement of Intent to, 28, 29
Registration procedures, 55
Registration Fee Child Care Subsidy Program, 38
Religious Studies Program, 358–359
Repeated courses, 62–63
Reproduction (Veterinary Medicine), 359–360
Requirements, bachelor's degree, 68–82
Residence halls, 37
Residence requirement, 69, 76, 80, 395–396
Retention data, 400
Rhetoric and Communication, 360–362
Rheumatology-Allergy, 306–307
Ridesharing, 39
FOTC (see Military Science), 318
R.S.V.P. (telephone registration), 55, 56
Russian, 362–364
Satisfactory/Unsatisfactory grading, 62
Satisfactory academic progress, 56, 65–66
Scandinavian, 364
Scholarship deficiencies, 65–66
Scholarship requirement, 23, 69, 74, 76, 80
Scholarships, 35, 63
Science and Society, 364–365
Sexual harassment, policy against, 397
Shuttle, campus, 39
Silo Union, 40
Social Science Data Service, 19
Social Theory and Comparative History, 365
Sociology, 365–369
Soil and Water Science, 369–370
Soil Science, 370–371
Soci Science (A Graduate Group), 371
Spanish, 371–374
Special Transitional Enrichment Program (STEP), 50
Speech (see Rhetoric and Communication)
Spirit Squad, 44
Statement on Legal Residence, 395–396
Statistics, 374–377
Statistics (A Graduate Group), 377
Steinbuch Cold Canyon Reserve, 16
STEP, 50
Student
Activities, 44
Affirmative Action, 28, 49, 50
conduct and discipline, 44
employment, 36, 39
Experimental Farm, 16
family housing, 37
government, 42–43
health services, 37–38
housing, 37
judicial affairs, 42, 44, 50
records, disclosures from, 397
responsibilities, 44
services, 37–39
Special Services, 51–53
Study plan approval, 74
Subject A (English requirement), 68
Subject requirements, 22
Substance abuse prevention, 51
Summer Advising, 49
Summer Sessions, 66, 70
Surgery (Medicine), 314
Surgery (Veterinary Medicine), 377–378
Sustainable Agriculture Program, 16
Swedish, 364
Swimming pools, 40
Teacher Credential Program, 87
Telephone registration (R.S.V.P.), 55, 56
Textile Science (see Fiber and Polymer Science)
Textiles (A Graduate Group), 378
Textiles and Clothing, 378–380
(see also Fiber and Polymer Science)
Theoretical Dynamics, Institute of, 18
Tours, 12
Toxicology (see Environmental Toxicology; Veterinary Pharmacology and Toxicology)
Toxicology and Environmental Health, Institute of, 15
Transcripts, 63
Transfer
admission, 24, 26, 28
credit, 24, 70, 90
intercampus, 26
scholastic deficiencies, 66
Student Services, 52
to College of Engineering, 26
Transportation and Parking, 39
Tuition, 31, 395–396

UC Agricultural Issues Center, 16
UC Davis Presents, 41
UC Davis Washington Center, 388
Units
limitations, 55, 79–80
quarter to semester, 57
requirements, 69, 74, 75, 79
value, 57
UNITRANS, 39
University Extension, 28, 69, 74, 75–76, 79
University of California, 12
Urology, 314

Variable-unit courses, 55
Vegetable Crops, 380–381
Veterans affairs, 53
Veterinary Anatomy and Cell Biology, 381
Veterinary Genetics Laboratory, 18
Veterinary Medicine, School of, 99–101, 381–385
Veterinary Medicine Teaching and Research Center, 18
Veterinary Microbiology and Immunology, 385–386
Veterinary Pharmacology and Toxicology, 386
Viticulture and Enology, 386–388

War-Peace Studies, 386
Washington Center, UC Davis, 388
Water Resources Center, 16
Water Science, 388–389
Water Science (A Graduate Group), 389 (see also Hydrologic Science)
Wildlife and Fisheries Biology, 389–391
Withdrawals, 32, 64–65
Women’s Resources and Research Center, 39, 53
Women’s Studies Program, 391–393
Work-learn (see Internship and Career Center)
Work-Study, 34–35

X-Ray Crystallographic Facility, 19

Zoology (see Biological Sciences), 139–140, 393
Internships

BICYCLES

Location Location Location