UCDAVIS

general catalog
1990-91
HOW TO USE THIS CATALOG

The UC Davis General Catalog is a source of information about the Davis campus course offerings, academic programs, campus facilities, services, fees, requirements, and campus life. While we attempt to provide information for all of these uses, you may find that some information you need is not given. Therefore, throughout the book, we refer to other publications available from individual offices or departments. In the Address Directory you will find a list of the most frequently questioned offices and their addresses. (Please refer to the Index for locations of other offices or department addresses.) In the Appendix, there is a list of major publications and where you can request them.

The General Catalog is divided into four major sections:

• Information about the University and the campus, student services, fees, admission, and scholastic and degree requirements
• Information about individual schools and colleges
• Descriptions of specific courses of study, undergraduate major requirements and courses offered, graduate study, and lists of the faculty in departments and programs
• Appendix and Index

If you are a prospective student, the first section of the catalog will answer your questions about the Davis campus—what it's like and what makes it special. You should supplement this impression by reading, in the second section, the description of the college or school which interests you. Section three is intended to answer the question, "What does UCD offer to help me reach my goals?" If you are a prospective freshman or international student, you may find it helpful to look over the glossary of unfamiliar terms in the Appendix. The names of some majors may not convey to you what academic areas courses cover, so check the lists of courses offered to satisfy the requirements of any unfamiliar major. Department chairpersons, program directors, major advisers, or any faculty member listed with these major offerings would be happy to answer any further questions you might have.

Prospective graduate students might also wish to send for the Announcement of the Graduate Division (Graduate Division Office, 252 Mrak Hall) which provides descriptions of graduate programs and requirements (but no course listings).

Current students should refer to the General Catalog throughout their years here to answer specific questions on regulations, requirements, and course offerings. Although every effort is made to keep the General Catalog correct and current, inevitably there will be some changes in courses offered or instructors assigned. You should, therefore, check the quarterly Class Schedule and Room Directory for the up-to-date list of courses offered.

Advisers of prospective students may wish to send for the Planning Guide to Majors, distributed by the Office of Relations with Schools, for more comprehensive information on programs and their requirements.

We are always trying to make the General Catalog more helpful, so please let us know of difficulties you encounter in using it or send us your suggestions for improvement (Publications Office, Repro Graphics Building, or Office of the Registrar, 117 Mrak Hall).
IT IS THE RESPONSIBILITY OF THE INDIVIDUAL STUDENT TO BECOME FAMILIAR WITH THE ANNOUNCEMENTS AND REGULATIONS OF THE UNIVERSITY PRINTED IN THIS CATALOG AND THE CLASS SCHEDULE AND ROOM DIRECTORY.

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

Price $4.00. Cost by mail (includes price of catalog): first class $8.00, overseas: $17.00 airmail or $11.50 surface mail; pay by check or money order (payable to The Regents of the University of California); mail to Office of the Registrar, University of California, Davis, CA 95616-8692.
ADDRESS DIRECTORY

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

Office of the Chancellor
MkHALL
916-752-2065

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

College of Engineering
2132 Bainer Hall
916-752-0553

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

Graduate Division
252 Mkr Hall
916-752-0650

School of Law
1011 King Hall
916-752-0243

Graduate School of Management
308 Voorhis Hall
916-752-7382

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

School of Veterinary Medicine
1018 Haring Hall
916-752-1350

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

University Extension
1333 Research Park Drive
916-752-0880

Admissions
Undergraduate:
Office of Admissions
175 Mkr Hall
916-752-2971

EOF Office of Admissions
175 Mkr Hall
916-752-2993

Graduate:
Graduate Division Admissions
252 Mkr Hall
916-752-0655

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

Management:
Graduate School of Management
311 Voorhees Hall
916-752-7399

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

Veterinary Medicine:
School of Veterinary Medicine Admissions
916-752-1383

Office of the Registrar
124 Mkr 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 Division
252 Mkr Hall
916-752-7481

Teaching and Research Assistantships
Write to department or group concerned. Addresses given in the Announcement of the Graduate Division.

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 SIO 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 Mkr Hall
916-752-1930

Relations with Schools/EOP Outreach Services
2626 Chiles Road
916-757-3108

Residency Matters, Attorney in
590 University Hall
University of California
Berkeley, CA 94720

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

Information Services Office
129 Mkr Hall
916-752-0539
(campus tours, maps, and information)
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Pick up registration and course enrollment materials (all continuing students)</td>
<td>May 31-Aug. 3</td>
<td>Nov. 5-9 (1990)</td>
<td>Feb. 11-15</td>
<td>May 30-Aug. 2</td>
</tr>
<tr>
<td>Faculty advisers available to all students</td>
<td>May 31-June 1</td>
<td>Nov. 8-9</td>
<td>Feb. 14-15</td>
<td>May 30-31</td>
</tr>
<tr>
<td>Turn in course enrollment forms and student data card (all continuing students)</td>
<td>May 31-Aug. 3</td>
<td>Nov. 5-9</td>
<td>Feb. 11-15</td>
<td>May 30-Aug. 2</td>
</tr>
<tr>
<td>Turn in fees along with fee statement (all continuing students)</td>
<td>May 31-Aug. 17</td>
<td>Nov. 5-21</td>
<td>Feb. 11-Mar. 1</td>
<td>May 30-Aug. 16</td>
</tr>
<tr>
<td><strong>Quarter begins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientation and testing</td>
<td>Sept. 24, Mon</td>
<td>Jan. 3, Thur</td>
<td>Mar. 28, Thurs</td>
<td>Sept. 23, Mon</td>
</tr>
<tr>
<td>In-Person Registration</td>
<td>Sept. 24-26</td>
<td>Jan. 3-4</td>
<td>Mar. 28-29</td>
<td>Sept. 23-25</td>
</tr>
<tr>
<td>In-Person Enrollment</td>
<td>Sept. 25</td>
<td>Jan. 3-4</td>
<td>Mar. 28-29</td>
<td>Sept. 23-24</td>
</tr>
<tr>
<td>Final day to petition for reclassification to resident status</td>
<td>Sept. 26</td>
<td>Jan. 4</td>
<td>Mar. 28</td>
<td>Sept. 25</td>
</tr>
<tr>
<td><strong>Instruction begins</strong></td>
<td>Sept. 27, Thurs</td>
<td>Jan. 7</td>
<td>Apr. 2</td>
<td>Sept. 26</td>
</tr>
<tr>
<td>Final day</td>
<td>Oct. 10, Wed</td>
<td>Jan. 18, Fri</td>
<td>Apr. 12, Fri</td>
<td>Oct. 9, Wed</td>
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<tr>
<td>• of late registration</td>
<td></td>
<td></td>
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<tr>
<td>• for filing petitions to change status from part-time to full-time student, or vice versa</td>
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</tr>
<tr>
<td>• for filing petitions to add courses to study list without paying a $3 service fee</td>
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<tr>
<td>• for filing petitions for PELP</td>
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</tr>
<tr>
<td>Final day</td>
<td>Oct. 31, Wed</td>
<td>Feb. 8, Fri</td>
<td>May 3, Fri</td>
<td>Oct. 30, Wed</td>
</tr>
<tr>
<td>• to petition to add or drop courses (thereafter permission may be granted only by the dean of your school or college and only under exceptional circumstances)</td>
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<tr>
<td>• to file petitions with the dean of your college or school to take courses on a P/NI basis. Exceptions rarely approved</td>
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<tr>
<td>• to file petitions with the Dean of the Graduate Division to take courses on a S/U basis</td>
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<tr>
<td>Deadline for filing Independent Study Program project proposal form with the Academic Senate Committee on Courses of Instruction</td>
<td>July 13</td>
<td>Oct. 10</td>
<td>Jan. 18</td>
<td>April 12</td>
</tr>
<tr>
<td><strong>Instruction ends</strong></td>
<td>Dec. 7, Fri</td>
<td>Mar. 15, Fri</td>
<td>June 6, Thurs</td>
<td>Dec. 6, Fri</td>
</tr>
<tr>
<td>Final examinations</td>
<td>Dec. 10-15</td>
<td>Mar. 18-23</td>
<td>June 8-14</td>
<td>Dec. 9-14</td>
</tr>
<tr>
<td><strong>Quarter ends</strong></td>
<td>Dec. 15, Sat</td>
<td>Mar. 23, Sat</td>
<td>June 14, Fri</td>
<td>Dec. 14, Sat</td>
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<tr>
<td>Commencement</td>
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<tr>
<td><strong>Academic and Administrative Holidays</strong></td>
<td>Nov. 22-23</td>
<td>Jan. 21</td>
<td>May 27</td>
<td>Nov. 28-29</td>
</tr>
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<td></td>
<td>Dec. 24-25</td>
<td>Feb 18</td>
<td></td>
<td>Dec 24-25</td>
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<tr>
<td></td>
<td>Dec. 31-Jan. 1</td>
<td>Mar. 25</td>
<td></td>
<td>Dec. 31-Jan. 1</td>
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</tbody>
</table>

**Summer Session I**
June 24-Aug. 2, 1991

**Summer Session II**
Aug. 5-Sept. 13, 1991

*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory. Additional deadlines can be found in the chapters following.
Note: Thursday, March 14, and Thursday, June 6, treated as Monday for class schedule purposes.
# DEGREES OFFERED BY UC DAVIS

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

<table>
<thead>
<tr>
<th>Major or Discipline</th>
<th>Degree*</th>
<th>Administering School or College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeronautical Science and Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Afro-American Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Agrarian Studies</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</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 Economics</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 Engineering</td>
</tr>
<tr>
<td>Agricultural Education</td>
<td>B.S., Credential</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Agricultural Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
</tr>
<tr>
<td>Agricultural Engineering: Aquaculture and Fisheries Option</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
</tr>
<tr>
<td>Agricultural Engineering: Food Engineering Option</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
</tr>
<tr>
<td>Agricultural Engineering: Forest Engineering Option</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Agricultural Science and Management</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Agronomy</td>
<td>M.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>American Studies</td>
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<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Animal Behavior</td>
<td>Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Animal Science</td>
<td>B.S., M.A., M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Anthropology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Applied Mathematics</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Applied Behavioral Sciences</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Art</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Art History</td>
<td>M.F.A.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Art Studio</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<td>Atmospheric Science</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Avian Sciences</td>
<td>B.S., M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Biochemistry</td>
<td>B.S., M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Biological Sciences</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<td>Biomedical Engineering</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Biophysics</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Botany</td>
<td>A.B. or B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Business Administration</td>
<td>M.B.A.</td>
<td>Graduate School of Management</td>
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<tr>
<td>Cell and Developmental Biology</td>
<td>Ph.D.</td>
<td>College of Engineering</td>
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<td>Chemical Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<tr>
<td>Chemical Engineering or Materials Science and Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Chemistry</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Chicano Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<td>Child Development</td>
<td>M.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Civil Engineering</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Civil Engineering or Materials Science and Engineering</td>
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<td>College of Letters &amp; Science</td>
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<tr>
<td>Classical Civilization</td>
<td>M.A.</td>
<td>College of Letters &amp; Science</td>
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<td>Classics</td>
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<td>College of Letters &amp; Science</td>
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<td>Community Development</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Community Nutrition</td>
<td>A.B., M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Comparative Literature</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Comparative Pathology</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Computer Science</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Computer Science and Engineering</td>
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<td>College of Letters &amp; Science</td>
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<td>Computer Science</td>
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<td>College of Letters &amp; Science</td>
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<td>Consumer Food Science</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Design</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Dietetics</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<td>Dramatic Art</td>
<td>A.B., M.A., M.F.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Earth Sciences and Resources</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>East Asian Studies</td>
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<td>College of Letters &amp; Science</td>
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<td>Ecology</td>
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<td>Electrical Engineering</td>
<td>M.A., M.Ed., credential</td>
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<td>Electrical Engineering or Materials Science and Engineering</td>
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<td>Environmental Policy, Analysis, and Planning</td>
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<td>Subject</td>
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<td>College</td>
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<td>Fermentation Science</td>
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<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>College of Letters &amp; Science</td>
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<tr>
<td>Latin</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Law</td>
<td>J.D.</td>
<td>School of Law</td>
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<tr>
<td>Linguistics</td>
<td>A.B. or B.S., M.A., M.A.T., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Mathematics</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<tr>
<td>Mechanical Engineering</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Mechanical Engineering or Materials Science and Engineering</td>
<td>B.S.</td>
<td>College of Engineering</td>
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<td>Medicine</td>
<td>M.D.</td>
<td>School of Medicine</td>
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<td>Medieval Studies</td>
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<td>College of Letters &amp; Science</td>
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<td>Microbiology</td>
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<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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<tr>
<td>Music</td>
<td>A.B., M.A., M.A.T., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Native American Studies</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Neurobiology</td>
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<td>College of Letters and Science</td>
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<td>Nutrition</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Nutrition Science</td>
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<td>College of Letters &amp; Science</td>
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<tr>
<td>Pharmacology and Toxicology</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Philosophy</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Physical Education</td>
<td>A.B. or B.S., M.A.</td>
<td>College of Letters &amp; Science</td>
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<td>Physics</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<td>Physics, Applied</td>
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<td>College of Letters &amp; Science</td>
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<tr>
<td>Physiology</td>
<td>B.S., M.S., Ph.D.</td>
<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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<td>Plant Biology</td>
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<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Plant Pathology</td>
<td>M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Plant Protection and Pest Management</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Plant Science</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<td>Political Science</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Political Science—Public Service</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<td>Preventive Veterinary Medicine</td>
<td>M.P.V.M.</td>
<td>School of Veterinary Medicine</td>
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<td>Psychology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Range and Wildlands Science</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Religious Studies</td>
<td>A.B.</td>
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<td>Resource Sciences</td>
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<td>Rhetoric and Communication</td>
<td>A.B., M.A.</td>
<td>College of Letters &amp; Science</td>
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<td>Russian</td>
<td>A.B., M.A.</td>
<td>College of Letters &amp; Science</td>
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<td>Sociology</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Sociology—Organizational Studies</td>
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<td>College of Letters &amp; Science</td>
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<td>Soil Science</td>
<td>M.S., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Soil and Water Science</td>
<td>B.S.</td>
<td>College of Letters &amp; Science</td>
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<td>Spanish</td>
<td>A.B., M.A., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Statistics</td>
<td>A.B. or B.S., M.S., Ph.D.</td>
<td>College of Letters &amp; Science</td>
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<td>Textiles</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Textiles and Clothing</td>
<td>B.S.</td>
<td>School of Veterinary Medicine</td>
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<td>Vegetable Crops</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Veterinary Medicine</td>
<td>D.V.M.</td>
<td>School of Veterinary Medicine</td>
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<td>Water Science</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<td>Wildlife and Fisheries Biology</td>
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<td>College of Letters &amp; Science</td>
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<td>Women's Studies</td>
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<td>Colleges of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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<td>Zoology</td>
<td>A.B. or B.S., M.A., Ph.D.</td>
<td>College of Agricultural &amp; Environmental Sciences or Letters &amp; Science</td>
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Introduction
THE DAVIS CAMPUS

Theodore L. Hullar, chancellor of UC Davis, administers this campus of more than 22,500 students and over 1,700 teaching faculty.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. The Graduate Division 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 5,300 students are engaged in graduate or professional study.

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, Association of American Medical Colleges, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Society of Landscape Architects, the Commission for Teaching Preparation and Licensing, 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 Vice Chancellor—Academic Affairs, Mrek Hall.

UCD's History

The Davis campus grew out of legislation passed in 1905 establishing a "University Farm" where young men and women could combine the scientific whys with technical hows in agriculture. The land for the campus was purchased in 1906, and the first students came to Davis in 1908, some for limited course work and some from UC Berkeley for practical training in agriculture.

The demand for greater educational opportunities in the state increased rapidly and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted those who completed the Davis program. A few years later, the Davis campus had its own College of Agriculture and, in 1948, the School of Veterinary Medicine (still the only one in the state) was established.

The campus's most rapid expansion began in 1951 when the College of Letters and Science was founded and more varied degree programs became available. In 1959, The Regents declared Davis a general campus of the University. By 1961, graduate programs were so numerous that a Graduate Division was established as a separate administrative unit. The College of Engineering came into existence the following year, owing much to the foundation already provided by the curriculum in agricultural engineering. 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. The Graduate School of Management began holding classes in the fall of 1981.

The quality of undergraduate instruction is a prime concern of the faculty, students, and administration at Davis. Creative teaching and academic innovation are encouraged by several programs, including the Distinguished Teaching Awards (for which students can nominate outstanding faculty members), a $25,000 prize for undergraduate teaching and scholarly achievement (believed to be among the largest of its kind in the nation), instructional improvement funds (for improving the quality of undergraduate teaching), the Teaching Resources Center programs which aid faculty members and teaching assistants in sharpening their teaching skills, and the Learning Skills Center programs which assist in the preparation of materials for use in classrooms and in self-paced learning activities. Student Viewpoint, a student-written and published evaluation of classes and instructors, is compiled each year from course questionnaires completed by students.

UCD has long been known for teaching and research in agricultural sciences. The reputation of the Davis campus in many other fields has advanced as Davis has moved into the ranks of the top 20 general research universities in the United States.

The Setting

The Davis campus lies adjacent to the city of Davis (population 44,250), 15 miles west of Sacramento and 72 miles northeast of San Francisco. Sacramento, with all its resources as the state capital, is only 20 minutes away, yet Davis is surrounded on all sides by open space—including some of the most valuable agricultural land in the state. The total campus comprises approximately 3,600 acres. About 980 acres are devoted to the central campus, the remainder being used for agricultural research and for such special facilities as the Veterinary Medical Teaching Hospital, the California Primate Research Center, and the University Airport. (The University of California, Davis, Medical Center is located in Sacramento.)

Its location makes Davis ideal for access to outdoor recreation. Within a 70-mile radius are Lake Berryessa, Folsom Lake, Clear Lake, the famed Napa Valley, and the historic Mother Lode country. San Francisco is a little more than an hour's drive from Davis along Interstate Highway 80. The coastal areas of Mendocino and Santa Cruz are about 150 miles from Davis, as are Lake Tahoe and the ski areas of the Sierra Nevada.

Winters in Davis are mild, with the temperatures usually above freezing. It rarely snows in the winter, but you should get good use from your raingear. Average winter temperatures range from 36 degrees to 54 degrees. Summers are sunny, hot, and dry. Although some days the thermometer may exceed 100 degrees, the overnight temperatures can drop into the fifties. Davis weather in the spring and fall is among the most pleasant in the state.

Davis is very much a bicycling town. Approximately 46 miles of bike paths and 40,000 bicycles have given Davis the title "City of Bicycles." One study found that bicycles are used for 25 percent of all travel in Davis.

The central UCD campus is closed to motor vehicles and automobile parking lots are located on its perime-
Special parking places are reserved for disabled drivers (those with special disability license plates) and ramps at most buildings provide easy access for wheelchairs. Sidewalks have inclines to street level at intersections.

The Yolo Bus linking Davis with the nearby cities of Woodland and Sacramento is supplemented by UniTrans, seven bus lines operated by the Associated Students. A Greyhound bus terminal and Amtrak station are also located in town, and the Sacramento Metropolitan Airport is a 20-minute drive from Davis.

Campus Life

The Davis campus has always been especially noted for its friendliness and informality. To many people, Davis brings to mind Picnic Day (the annual campus open house in April) and the almost universal use of bicycles within the community. Since the Davis campus is a residential community and was originally small and isolated, a tradition of close relations between students and faculty has developed. Even though the campus has now grown to more than 22,500 students, its style remains friendly, informal, and personal. As the campus moves into the nineties, a special effort is being made to reflect the diversity of the general population by attracting more ethnic minorities, students with disabilities, and other underrepresented groups. The campus’ commitment to a diverse community of faculty, staff, and students, and to the preservation of an environment characterized by mutual respect and understanding are reflected in the “Principles of Community” (see the following page).

Beneath the casual and informal outlook of Davis students, however, there is an underlying seriousness and an emphasis on academic excellence. Davis students do study hard. However, those who think of Davis as just a place to study will be surprised by the variety of activities happening every day on campus. There is rarely a night without at least one movie, a day without a long list of public lectures, or a weekend without a play, concert, or special event.

The City of Davis

The year 1868 marked not only the Act of the Legislature chartering the University of California but also the completion of the California Pacific Rail Road line from Vallejo to a junction located on the former Jerome C. Davis farm and the founding of the city of “Davisville.”

The community is closely tied to the University (more than half of the people in Davis are University students, faculty members, or staff) yet the city has developed its own recreational, cultural, and community outlets to supplement the University’s offerings. The Davis Art Center, adult education programs, Davis Comic Opera Company, Davis Musical Theatre Company, community theater, local galleries, recreation and parks programs, and civic organizations have strong local support. The Veterans Memorial Center complex is a focus of community events and has facilities for concerts and theater performances, exhibits, meetings, and special events.

Since its early years, Davis has recognized the importance of open space. It now operates 18 large and grassy city parks, many with tennis courts, playgrounds, swimming pools, and playing fields, as well as a municipal golf course.

The city of Davis is changing. It still retains many characteristics of the small college town it once was, but the growth of the University has brought a corresponding development within the community. Despite the pressures of growth, people in Davis are actively concerned with maintaining the quality of life here. The small-town flavor is being preserved in the downtown core area—the city’s central business district—and action by the citizens and City Council have emphasized that concern with the quality of life means a commitment to planned, environmentally sound development and limited growth.

Davis is possibly the most energy-conscious city in the U.S. Since 1973, average residential electrical consumption has dropped by 20 percent, while natural gas consumption has been reduced more than 40 percent. A series of energy-savings ordinances passed since 1968 regulates such things as new home insulation and window area and requires all new housing developments to have bicycle paths.

The Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings—the newest is the four-story Shields Library expansion completed in early 1990—contrasting with the older, original wooden structures from the University Farm days. The first building on campus, University House, is still in use providing office space for the Agricultural Issues Center and the California Center for Cooperatives.

The spirit of the campus’s past as the University Farm gives UCD a sense of tradition. A University is never static, always changing to meet new needs and new conditions. Looking back, we can see that the campus has developed in ways which the founders of the University Farm could never have envisioned. But looking ahead, out of an era in which the role of the University in society is being reexamined, we can predict that the Davis campus will retain its fundamental assumption that academic programs at all levels of the University—undergraduate, graduate, professional, and research—must reinforce and strengthen each other.

The root word of University, the Latin universitas—entirety—reflects UCD’s aim to bring together learning and life, scholarship and teaching, theory and practice, and general and professional education.

THE UNIVERSITY OF CALIFORNIA

When the first transcontinental railroad cars steamed into the western terminal in Sacramento, only 40 students—taught by 10 professors—were enrolled in the University of California. A year earlier, in 1868, Governor Henry H. Haight signed the Organic Act which provided that a “complete University” be created for the State of California. Classes began in 1869 on the campus of the College of California in Oakland. The first few buildings on the Berkeley campus were completed in 1873, and that year the University took up residence in its new home. The following June,
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.*
degrees were conferred upon the University's first 12 graduates.

Today the University has nine campuses throughout California—Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere, features, and character; all are recognized nationally and internationally as distinguished educational institutions. Some 150 laboratories, Extension centers, and research and field stations on campuses and in other parts of the state strengthen research and teaching while providing public service to California and the nation.

The nine campuses of the University have a current enrollment of more than 164,600 students, 90 percent of them residents of California. Almost one-quarter of the students are studying at the graduate level.

The University's reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. The University has 20 Nobel Laureate winners on its faculty, and the total membership from all nine campuses in the National Academy of Sciences is the largest of any college or university system in the country. In 1989, 20 scholars from within the University received fellowship grants from the John Simon Guggenheim Foundation. These fellowships are among the highest honors that scholars can receive.

Governance of the University is entrusted to a corporation called The Board of Regents. 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. David Pierpont Gardner is president and head of the University-wide administration. Authority for the administration of each campus has been delegated to a chancellor.

THE UNIVERSITY LIBRARY

Information:
General Library Administration
108 Shields Library
916-752-6561

The General Library at UC Davis consists of five interdependent facilities: the Peter J. Shields Library, the Physical Sciences Library, the Agricultural Economics Library, the Loren D. Carlson Health Sciences Library, and the UC Davis Medical Center Library in Sacramento. Additional material is shelved in the Annex in Surge II. There are also a number of specialized departmental libraries located on the campus, and an independent Law Library located at the King Hall School of Law.

Together, the libraries contain over 2.5 million volumes and receive more than 51,000 periodical and journal titles annually. Resources in the natural and agricultural sciences are outstanding, and there are strong collections as well in the humanities, fine arts, social sciences, and engineering. In addition to the book collections, there are over 2.7 million items on microcopy, 214,000 maps, 591,000 pamphlets, and 13,000 sound recordings.

Shields Library houses the Departments of Humanities/Social Sciences, Biological/Agricultural Sciences, Government Documents, Special Collections, and Access Services, the Current Periodicals and Bio/Agr Periodicals sections, Interlibrary Loan, and the Reserve Service. The library's general administrative offices and the technical processing departments are also located there. The Shields Library was expanded in 1990 with the addition of a west wing; other areas of this facility will be under renovation until the summer of 1991.

Shields Library is an official depository for federal and state publications, and the Government Documents Department provides services that make it easier to use these materials. Current issues of more than 7,000 journal and newspaper titles are housed in the two periodicals areas and are available for in-library use only. The Reserve Service makes short-term loans of items which are heavily used for class assignments. Special Collections houses rare books, manuscripts, photographs, and pamphlets that support research in the arts and humanities. Notable subject strengths include nineteenth-century British literature, American avant-garde poetry, the performing arts, the history of agriculture, viticulture, entology, rural life, and technology.

Special Collections also administers the University Archives, which include UC Davis theses and dissertations, and the Michael and Margaret B. Harrison Western Research Center, an 18,000-volume collection documenting the history and development of the trans-Mississippi west from the mid-nineteenth century to the present, with particular emphasis on the American Indian. Other facilities in Shields Library include a browsing collection for recreational reading, the map and microcopy collections, audio-visual equipment, and copy machines at various locations.

The collections of the Physical Sciences Library consist of over 242,000 volumes, and support teaching and research in engineering, computer science, physical sciences, and mathematics. The library maintains
a collection of approximately 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. A collection of approximately 10,000 geological maps is also housed here.

The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 220,000 volumes. The library at the UC Davis Medical Center in Sacramento provides a clinical collection of 23,000 volumes. The Agricultural Economics Library holds more than 7,300 volumes and 243,000 pamphlets in this field.

Compact disk databases of references to periodical articles in a number of fields are available in the Departments of Biological/Agricultural Sciences, Humanities/Social Sciences, and Government Documents of Shields Library, and in the Physical Sciences, Carlson Health Sciences and UC Davis Medical Center Libraries for use without charge. These libraries also offer a fee-based service which connects local terminals to computerized databases that provide information and bibliographies from periodical literature and other publications of the last 20 years, often including abstracts, in almost all subject areas. Numeric and directory information is also available. Most databases also provide selective dissemination of information (SDI) to help researchers regularly update their personal bibliographic files.

The MELVYL online catalog contains the bibliographic records of the entire collections of the Physical Sciences, the Carlson Health Sciences, and the Law Libraries, and of most books and periodicals held in Shields Library and on the other eight campuses of the University of California. The online catalog also contains the latest five years of records of MEDLINE, the standard periodical index for health sciences, and the latest year of citations in all sections of CURRENT CONTENTS. Other periodical indexes are being evaluated for addition to the online catalog.

The libraries provide orientation and assistance in using the various collections, most of which are available on an open-stack basis. Audiocassette walking tours and lectures on the resources of the libraries are part of the Educational Services Program. Three courses for credit are offered: "Introduction to Library Research" (English 28), "Library Research Methods and Resources in the Biological and Agricultural Sciences" (Entomology 298), and "Biomedical Information Resources and Retrieval" (Epidemiology and Preventive Medicine 401). Specialized equipment to facilitate library use by disabled patrons is available in most libraries on campus. Telephones designed to communicate with hearing-impaired persons are available in Shields, the Physical Sciences, and Carlson Health Sciences Libraries. A Kurzweil reading machine, which converts printed text to spoken form, is located in the Reserve Service in Shields Library; additional equipment for vision-impaired users is available in the other libraries. The libraries cooperate with the Disability Resource Center in providing this equipment. Users requiring other accommodations because of disabilities are encouraged to inquire at any reference desk; the libraries are committed to a policy of service to all users.

Interlibrary loan services allow borrowers to obtain materials from libraries throughout the University of California system and from all over the world. Some less-used library materials are located in the Northern Regional Library Facility, operated by the four UC campuses in northern California. All volumes are accessible within 48 hours by leaving a request at the circulation desk in Shields Library.

Daily inter-campus bus service between Davis and Berkeley is available to facilitate library research and other scholarly activities. Information about reservations and cost for these buses is available in departmental offices or from the central garage.

RESEARCH AND SERVICE ACTIVITIES

The following facilities are connected with the Davis campus. Some are designed for the purpose of research, some for research and teaching, others to provide services to Davis students, faculty, or the surrounding community.

The University Arboretum

Arboretum Headquarters

916-752-2498

The University Arboretum occupies an area of about 150 acres and provides a living collection of plants along Putah Creek's historic north fork for teaching and research. The plants are attractive dry-land trees and shrubs. The acreage includes demonstration gardens, paths, campus art, and picnic tables for recreation.

Outstanding plant collections are represented by the oaks in the Shields Grove, the California native trees and shrubs (in the Mary Wattis Brown Garden), and the T. Elliot Weier Redwood Grove. Other collections of great horticultural and botanical interest include plantings of acacia, eucalyptus, hakea, and exotic conifers, as well as various groups in the heath family (Ericaceae), legume family (Leguminosae), and myrtle family (Myrtaceae). Two gardens of herbaceous perennials are next to Shields Grove: the Carolee Shields White Flower Garden and the Ruth Risdon Storer Garden of hardy plants.

The Arboretum program of seed exchange is international in reputation and has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world.

Also, the Arboretum administers the Putah Creek Campus Reserve, about 150 acres of riverine woodland and wildlife along some three miles of the constantly flowing south fork of Putah Creek. This area is used for research and education.

Work-learn internships and work study for Davis students are available through the Arboretum in botany, horticulture, landscape architecture, and environmental education.
Agricultural History Center
378 Voorhies Hall
916-752-1827

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.

The Center was founded in 1964 and edits both the Journal of Economic History and Agricultural History, the journal of the Agricultural History Society. The Center also oversees a program that publishes bibliographies on American agricultural history.

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

The Bodega Marine Laboratory is an organized research unit dedicated to research and teaching in marine biology and related fields. Research areas include biochemistry, physiology, genetics, microbiology, ecology, aquaculture, and fisheries. A variety of undergraduate courses are taught during the academic year and summer session. Student housing is available. The Laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis. The Laboratory is surrounded by 362 acres of varied habitats which comprise the Bodega Marine Reserve.

California Primate Research Center
Primate Center
916-752-0447

The research staff of the California Primate Research Center (CPRC) investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral biology, developmental and reproductive biology, respiratory diseases, virology and immunology, and a variety of biomedical collaborative research projects. A major theme of the CPRC is the study of environmental influences on nonhuman primates and identification of spontaneously occurring disorders. Primate medicine and primate pathology teams are responsible for the health of the colony.

The Center, established in 1962, is supported by a grant from the National Institutes of Health. Many of the projects occurring at the center are funded by grants and contracts from a wide variety of extramural sources.

The facilities and training programs of the Center are currently being used by 34 core and collaborative faculty members, over 50 affiliate scientists, more than 50 undergraduate and graduate students, and visiting scientists.

The Campus Writing Center
TB 116
916-752-8024/3788

The Campus Writing Center is a campuswide program designed to provide writing instruction across the curriculum and to assist faculty and teaching assistants with the writing component of General Education courses. Its primary means of accomplishing this goal are through:
- Adjunct writing courses, and
- Writing workshops.

Adjunct writing course sections (English 102) are paired with specified courses in other disciplines. Because the reading and writing assignments in the adjunct courses are determined by the subject matter of the paired course, the adjunct courses offer students an opportunity to improve their writing skills while mastering the content of a specific discipline. In addition, English 102 courses, which carry three units of credit, fulfill the upper division composition requirement in the College of Letters and Science or partially fulfill the written and oral expression requirement in the College of Agricultural and Environmental Sciences.

The writing workshops are available upon request by faculty members or teaching assistants. The workshops focus on specific aspects of academic writing and are adapted to meet the needs of any field. In particular, workshops are designed to offer training and help to professors or teaching assistants in General Education courses who have responsibility for assigning, correcting, and evaluating student papers. Workshops are also conducted (upon the request of faculty members) for undergraduate students writing essay examinations or term papers.

The Campus Writing Center is affiliated with both the Office of the Vice Chancellor, Academic Affairs, and with the English Department.

Computing Services
Surge II
916-752-0233

Computing Services, with main offices at Surge II, serves the campus for batch, interactive timesharing, and remote job entry mainframe computing. Additionally, numerous microcomputers and scientific workstations are provided for student use. The department's primary concern is service to students and, therefore, instructional usage on the academic computer systems has priority over research and administrative users. Davis has developed an innovative Easy Access system of computing for student use. Any student on campus, upon presentation of a valid registration ID card at the Dispatch Counter in the basement of Hutchison Hall, may open an Easy Access account. A specified sum is allotted to each student from instructional funds, and, within general confines, the student may use the funds to purchase computer time for any project. Regularly scheduled computer-related and individual student courses are funded separately. Microcomputer labs are also provided at no direct charge to students.

Computers operated by Computing Services include: a Unisys A10FX, the primary administrative computer; a Unisys A6KX for administrative development work and A10FX backup; and three DEC VAX 11/785s and two VAX 8600s for academic use. Two additional VAX 11/785s are used to manage network activities. These systems support over 100 terminals located in four
student terminal rooms, plus over 3,000 additional terminals and microcomputers located throughout the campus. One of the terminal classrooms is designed primarily for teaching interactive graphics and is equipped with twenty-four color graphics terminals and six ink-jet color graphics copiers. During open hours these classrooms can be used by students any time that class instruction is not scheduled. Consultants are available to answer questions. Additionally, there are ten microcomputer labs with a combination of over 240 IBM PC compatible, IBM PS/2, and Macintosh microcomputers. There is also a 28 station SUN 3/50 scientific workstation laboratory.

The computer systems are accessed through the Develnet, a switching computer which allows the user to identify from an individual terminal the computer system required for the work which is to be accomplished. Computing Services also manages a Data Entry Group for key-to-disk entry of data into the computer systems.

Center for Consumer Research
148 Everson Hall
916-752-2547

The Center is a small research unit devoted to consumer issues. Major areas of interest include product and service quality, consumer information and education, consumer decision behavior, and institutions and public policy as they relate to consumer issues. Activities of the Center include support of consumer projects undertaken by faculty, graduate students, and Extension specialists, and a newsletter, in addition to a core research program. The Center also houses a library containing books and periodicals on consumer-related topics.

The Consumer Research Center began operation in 1977 and has been supported since that time by the College of Agricultural and Environmental Sciences and outside grants.

Adult Fitness Program
Department of Physical Education
916-752-2540

The Adult Fitness Program is open to people from the University, the city of Davis, and surrounding communities. It provides members with a comprehensive physical fitness evaluation and an individualized exercise program for improving cardiovascular endurance and fitness. The program is sponsored by the Department of Physical Education with considerable support from the Division of Cardiovascular Medicine, School of Medicine. Membership is unrestricted and participants may begin the program at any time during the year.

Emphasis is placed on the evaluation of cardiovascular fitness and health and on the assessment of body fat by underwater weighing. Participants receive blood chemistry analysis, nutrition analysis and counseling, resting12-lead electrocardiogram (ECG), exercise stress test with ECG, pulmonary function tests, body composition analysis, strength and flexibility tests. They also receive individual counseling for exercise training, weight control, and preventive medicine in general. Supervised exercise sessions include walking, jogging, swimming, and cycling. A cardiac rehabilitation program is offered to patients with heart disease and to individuals who have a high risk for developing heart disease.

Special activities of the Adult Fitness Program are offered to University students and employees. These
low-cost activities give participants an opportunity to have their body type and fatness determined, with personal counseling on how to achieve a desired body weight through proper nutrition and exercise. A "Shape-Up" program for students and staff is open at the beginning of each quarter and includes submaximal exercise testing, body composition analysis, and supervised exercise sessions.

**Early Childhood Laboratory**
TB 117 916-752-2888

The Early Childhood Laboratory (ECL) is sponsored by the Human Development and Family Studies unit in the Department of Applied Behavioral Sciences to provide a facility where students enrolled in Human Development courses can develop observational techniques and participate with peers, children, parents, and professionals in an early childhood program. The faculty help 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.

Four Laboratory programs accommodate children from ages six months to five years for three hours a day, following the academic calendar. Tuition is lower for UCD student families than for UCD staff, faculty, and community based families. A county program for children with special needs is housed at the ECL facility, and children and staff are fully integrated. Information about the ECL and enrollment procedures can be obtained by telephoning 916-752-2888 between 8:30 a.m. and 4:30 p.m. or writing to ECL, Department of Applied Behavioral Sciences.

**Veterinary Medicine Teaching and Research Center (VMTRC)**
18830 Road 112
Tulare, California 93274
(209) 866-1731

The facilities of the VMTRC at Tulare were occupied in January, 1983. Located in a region of the state that has concentrated, diversified livestock production enterprises, the Center has developed programs with livestock production units to serve as a principal clinical center of UCD's School of Veterinary Medicine for teaching, research, and service programs on food-animal herd health, preventive medicine, and production management.

**Water Resources Center**
University Extension Building 916-757-9901

The Water Resources Center is a Universitywide organized research unit charged with coordinating water resources research on the UC campuses. Through University research funds and funds from the U.S. Department of the Interior, 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 water resource systems engineering, economic evaluation of water develop-

**Facility for Advanced Instrumentation**
9 Hutchison Hall
916-752-0284

The Facility for Advanced Instrumentation supports research and instructional programs in electron microscopy, mass spectrometry, and morphometrics. The electron microscope laboratory houses scanning and transmission electron microscopes adjacent to a specimen preparation laboratory. Instruction in the theory and operation of the electron microscopes is provided by a unique autotutorial system and hands-on sessions with the microscopes. Morphometric analysis is supported by a computerized digitizing tablet and a digitizing video image analysis computer. The mass spectrometer laboratory consists of a quadrupole mass spectrometer and a high resolution double-focusing instrument. Both mass spectrometers have soft ionization and high mass capabilities and are interfaced to gas chromatographs and data acquisition systems. Instruction in the theory and operation of the mass spectrometers is offered throughout the year. Facility staff are available to teach students to use facility instruments, consult with users regarding experimental design, prepare samples and specimens for analysis, and operate the facility's instruments.

The Facility also promotes and coordinates the shared use of major scientific equipment located in various campus departments, including electron microscopes, an electron microprobe, an x-ray fluorescence spectrometer, an x-ray diffractometer, a paleomagnetometer, a scintillation counter, a cesium irradiator, and a whole body counter.

**Institute of Ecology**
2132 Wickson Hall 916-752-3026

The Institute of Ecology was established in 1966 as an organized research unit. The Institute fosters ecological and environmental research, provides intellectual leadership in ecology, administers resources and facilities, provides information on extramural support of ecological research, and maintains liaison 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. The Institute has management responsibility for the Jepson Prairie, Putah Creek, and Stebbins Cold Canyon reserves that are part of the UC Natural Land and Water Reserves System. The Institute's Cooperative Resources Studies Unit, supported by an agreement with the National Park Service, sponsors and administers research in the national parks of California.

More than one hundred faculty members plus graduate and undergraduate students from all the schools
and colleges on the Davis campus are involved in the Institute’s activities.

**Institute of Governmental Affairs**
Third Floor, Shields Library
916-752-2042

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 now sponsors ten research programs: Applied Macroeconomics; Rural Human Resources; East Asian Business and Development; Government and Politics; Applied Public Policy; International Conflict and Cooperation; Productivity and Quality Control; Pacific Rim Studies; Economy, Justice and Society; and Regulation and Deregulation in the American Economy. The Institute also supports a wide range of public affairs programs, seminars, and conferences, provides specialized library services, and oversees the Social Science Data Service.

**Institute of Marine Resources**
TB 186
916-752-2506

This statewide institute was organized in 1955 with headquarters at La Jolla. The marine food science component of the organization was located on the Berkeley campus, but in July 1970 it was transferred and became 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 seafoods. 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 hydrocarbon-utilizing yeast.

**Intercampus Institute for Research at Particle Accelerators**
Professor Richard L. Lander, Associate Director
355 Physics/Geology Building
916-752-1760

This Universitywide institute, established in 1977, conducts research that uses the unique facilities at national and international accelerator laboratories, particularly the Stanford Linear Accelerator Center, the Enrico 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, both theoretical and experimental. The Institute also promotes seminars and lectures by visiting researchers at individual campuses.

**Crocker Nuclear Laboratory**
Crocker Nuclear Laboratory
916-752-1400

This facility was established by the University in 1965 as 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, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging. Teaching activities at the undergraduate, graduate, and postdoctoral levels are in biology, medicine, radiochemistry, and physics.

**Institute of Toxicology and Environmental Health (ITEH)**
Institute of Toxicology and Environmental Health
916-752-1340

The Institute of Toxicology and Environmental Health (formerly the Institute for Environmental Health Research) coordinates interdisciplinary research concerned with biomedical and toxicological problems related to exposure to chemical, physical, and biological toxic agents or to ionizing radiation. The overall aim of the research at the institute is to determine basic mechanisms of toxic effects and to predict human health hazards from continual exposure to realistic levels of toxic substances in the environment or at the workplace. Studies on toxic, radioactive, mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, inhalation toxicology, and human epidemiology. The Institute houses major Universitywide programs in Toxic Substances and Occupational Health.
Serology Laboratory
Horse Bloodtyping Laboratory
Armstrong Tract
916-752-2211
Cattle Bloodtyping Laboratory
Armstrong Tract
916-752-7383

The Serology Laboratory was established in 1955 to provide blood-typing services for the animal breeding industry. The Laboratory is a self-supporting unit of the School of Veterinary Medicine; its facilities are available to students working towards M.S. and Ph.D. degrees in genetics, immunology, and comparative pathology.

The Laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities of the Serology Laboratory include: investigation of red cell, serum, lymphocyte and 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; application of blood typing tests to clinical veterinary medicine; investigation of the major histocompatibility complex (MHC) of cattle and horses and its role in resistance or susceptibility to a variety of diseases; study of the role of chromosome abnormalities in infertility; and investigation of the mode of inheritance of several suspected hereditary diseases.

The Laboratory works closely with the Equine Research Laboratory and the Livestock Diseases Research Laboratory, as well as with other departments, such as Animal Science.

Natural Reserve System

Information:
Natural Reserve System
300 Lakeside Drive, 6th Floor
Oakland, CA 94612-3560
(415) 987-0150

The University of California administers some 30 natural reserves throughout the state. These reserves comprise a representative cross-section of California's diverse ecosystems and include deserts, off-shore islands, mountains, and even submarine canyons. Unlike parks or wilderness areas, the reserves are devoted entirely to teaching and research purposes and are not available for recreation. Since 1965, when the program was initiated, the University, using non-state funds, has acquired these carefully selected sites which might otherwise have become unavailable for scientific study. UC Davis administers three Natural Reserve System reserves and one affiliated field site.

Bodega Marine Reserve

Peter G. Connors, Ph.D., Reserve Manager
P.O. Box 247
Bodega Bay, CA 94923
(707) 875-2020 or (707) 875-2211

Bodega Marine Reserve comprises 362 acres of coastal habitats near Bodega Bay in western Sonoma County, approximately 100 miles from the Davis campus. This site includes a remarkably diverse set of 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.

The attractiveness of this site for research and teaching is enhanced by the excellent on-site facilities of the Bodega Marine Laboratory. This modern, well-equipped laboratory consists of several buildings, with over 60 research and support staff. On-site housing is available for students and visiting researchers. More than 30 field research projects are currently active at Bodega Marine Reserve, making this one of the most productive reserves in the Natural Reserve System.

Jepson Prairie Reserve

Institute of Ecology
2123 Wickson Hall
UC Davis
916-752-6560

The Jepson Prairie Reserve is located fifteen miles south of the campus and comprises 1,566 acres of perennial bunchgrass grassland and vernal pools. The Jepson Prairie area is typical of habitats which 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. Long-term grazing and fire ecology research to aid in management of native grasslands began in fall 1986.

Stebbins Cold Canyon Reserve

Wesley W. Weathers, Ph.D.
Department of Avian Sciences
3302 Meyer Hall
UC Davis
916-752-1300

In 1979, the University purchased 277 acres of wildland in Cold Canyon as part of its Natural Reserve System. It is located twenty-four miles west of campus near Lake Berryessa. In 1984, 299 acres were added to the Reserve, which is named in honor of G. LEDYARD STEBBINS, professor emeritus of genetics. The Davis campus has administrative and management responsibility for the reserve, which will be maintained in its present natural state. The reserve is available for teaching and field research by scientists and students from all campuses of the University and researchers from other institutions of higher learning.

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.

Putah Creek Campus Reserve

Kerry Dawson
Environmental Design
UC Davis
916-752-2498

The University Arboretum administers a campus nature reserve known as the Putah Creek Campus Reserve. Putah Creek and its south fork flow along the southern boundary of the campus with the reserve
consisting of a 150-acre corridor along the north bank approximately 6 kilometers long and averaging 100 meters wide. Vegetation and wildlife include native and introduced species. The goals of the reserve are habitat conservation, education, research, and environmentally-directed recreation.

**Sustainable Agriculture Program:**
**Student Experimental Farm**

Information:
College of Agricultural and Environmental Sciences
916-752-7645

The Student Experimental Farm is an innovative teaching and research facility located on twenty-five acres of University land, and is the main focus of the Sustainable Agriculture Program. Since its inception in 1977, 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.

The farm offers students numerous opportunities to gain practical experience in areas such as organic crop production, aquaculture, small animal husbandry, farm operations, and seed saving. In addition, classes such as "Alternatives in Agriculture" and "Introduction to Sustainable Agricultural Systems" provide students with a chance to examine various agricultural issues in the classroom.

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. Whether interest is in organic or other farming systems, the farm can provide several services to facilitate student research projects.

**Carnegie Institution of Washington, Department of Embryology, Davis Division**
916-752-0210

The world-renowned Carnegie Embryological Collection, founded in Baltimore in 1914 by Franklin P. Mall, and the later collections of Hertig, Rock, Hartman, and Bluntschli, are now housed at UCD. The collection includes insectivore, prosimian, platyrhine, and catarrhine embryos.

The resources of this department are available to qualified investigators on a very limited basis, on application to the director.

**ADDITIONAL ACADEMIC RESOURCES**

**UNIVERSITY EXTENSION**
Information and catalogs:
1333 Research Park Drive
916-757-8777

The free quarterly University Extension catalog contains the current list of continuing education programs offered in Sacramento and Davis. Enrollment is open to the general public. No formal admission to student status is required to take advantage of the wide variety of stimulating programs.

Fields covered by University Extension courses include agriculture, business and management, computer studies, education, engineering, environmental studies, graphic design, health and human services, labor relations, liberal arts, personal financial planning, hazardous materials management, wilderness recreation, international travel study, and winemaking.

Programs vary in length and format, from one-day
conferences and short lecture series to certificate programs requiring attendance for several quarters. Classes are held both on and off campus. Instructors are drawn from the University and nearby college facilities, professionals in the field, and internationally known experts.

Enrollment fees enable University Extension to function as a financially self-supporting nonprofit organization.

ARTS AND LECTURES

Information:
104 Freeborn Hall
916-752-2523

UC Davis Arts and Lectures presents a wide variety of performing arts events for the student and campus community and audiences throughout the greater Sacramento region. During the academic year, Arts and Lectures presents concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern and ethnic dance; and lectures by eminent public figures.

Supported in part by student fees, Arts and Lectures provides UCD students with ticket prices of up to 50 percent off for all performances. Student volunteers usher at many performances and help with promotional activities; student employees work as drivers, office assistants and stagehands. Students also serve on the Committee for Arts and Lectures, the Chancellor's Advisory Committee composed of UCD staff, faculty and students which helps to select performing arts programs. Many Arts and Lectures events at UCD include free lecture-demonstrations, noon concerts and master classes for students. Arts and Lectures also works with the Department of Music co-sponsoring various performances throughout the year.

Annual and quarterly brochures and promotional materials for upcoming events are available through the Arts and Lectures office at the above location. Tickets for Arts and Lectures events may be purchased at the UCD Campus Box Office in Freeborn Hall.

CAMPUS EVENTS AND INFORMATION OFFICE (CEIO)

Information:
4th Floor, Memorial Union
916-752-2613

The Campus Events and Information Office provides a range of services to clientele seeking facility reservations, conference services, and special event presentations. CEIO is responsible for interpreting and applying campus policies related to the use of campus facilities and services. The staff of CEIO assists organizations in facility reservations and coordinating various services related to events. For further information contact this office at the above location.

The Information Services unit of CEIO provides general information regarding special events, campus tours, location of facilities, parking, etc. Information stations are located at 129 Mrak Hall (916-752-0539) and the Memorial Union lobby (916-752-2222). Questions pertaining to campus tours and tour programs should be directed to 129 Mrak Hall.

PUBLIC SERVICE RESEARCH AND DISSEMINATION PROGRAM

Information:
101 University Services Building
916-757-8820

The Public Service Research and Dissemination Program sponsors collaborative research efforts between
faculty and government or private agencies on public policy issues. Research and dissemination projects are solicited, reviewed and funded in the area of environment, agroecology, and global climate change. Collaborators are encouraged to assist in the research process and are involved in dissemination of findings.

Seminars, conferences and publications are used to link faculty and decision makers and to establish change in research directions.

**SUMMER SESSIONS**

Information:
44 Marak Hall
916-752-1647

Summertime 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. Special programs are also available in Great Britain, France, Italy, China, and Chile. 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 1991 there will be two six-week sessions at UC Davis: June 24 through August 2, and August 5 through September 13. For the Summer Sessions Bulletin and application materials (available about mid-March), write to the address above.

**WORK-LEARN INTERNSHIPS**

Information:
The Internship and Career Center
2nd floor, South Hall
916-752-2865

Where are you going with your life?

That question is hard to answer in today's complex world. You may need to clarify your personal or educational goals. Or expand your awareness of the "working world." Or find out if you are really interested in a career in business, research, teaching, or agriculture.

One way to make these and other important decisions is to participate in a work-learn internship. An internship expands your learning beyond the classroom and enables you to make better decisions for the future by helping you to assess your skills, explore career opportunities, and secure on-the-job experience.

You can take advantage of one of the hundreds of organized internships through the Internship and Career Center, or initiate your own. Established internships include opportunities in:

- liberal arts

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.

A notation describing the internship can be made on your transcript by obtaining prior approval from the Internship and Career Center. Approval for transcript notation is granted for completed internships which meet prescribed University standards as advertised by this office. Academic credit is awarded only for experiences planned and approved in advance by the sponsoring faculty member.

**UC DAVIS WASHINGTON CENTER**

Prof. Bruce W. Jentleson, Director

Information:
Donald J. Hagerty, Program Manager
Internship and Career Center
2nd Floor, South Hall
916-752-7260

The UC Davis Washington Center begins operations with 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 center for faculty and graduate students.

**Undergraduate Academic Internship Program**

The Davis Washington Center undergraduate program will operate on a 12-13 week "extended quarter" basis during fall 1990 (September 15-December 16) and spring 1991 (March 30-June 22). It 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. A 3.0 minimum grade-point average is recommended. Graduating seniors must apply for the fall quarter program.

The undergraduate program has three principal components:

- **Internships/Research Projects (6-8 units):** Students will work four days per week as interns in Congress, federal agencies, interest groups, trade associations, research institutions, the media, museums or in other organizations related to policy, politics, science and culture and geared to the interests and objectives of individual students. Drawing on the internship experience, each student will develop a research project, under the supervision of a member of the faculty.

- **Policy-Process Seminar (3-4 units):** This seminar focuses 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. In addition to regular instruction, seminars are likely to include guest speakers,
• Topical Interest Seminar (3-4 units): This course is of more general interest, designed to draw on some of the unique historical, scientific, cultural and artistic resources of Washington.

All courses will be taught by UC Davis faculty in residence or visiting faculty from the Washington area. Students will earn 12-16 units of academic credit, continue to be registered as full-time students, and fulfill university residency requirements.

Financial aid eligibility is maintained, and the aid package can be adjusted to reflect the additional costs of the Program. Some additional financial assistance also is available.

Students live in university-arranged housing, convenient to public transportation. Arrangements also are made to cover health services and other aspects of student life.

**EDUCATION ABROAD PROGRAM**

Information:
Education Abroad Program Office
323 South Hall
916-752-3014

Carolyn F. Wai, Ph.D., Campus Coordinator:
Assistant Vice Chancellor for International Programs
Dean's Office, College of Letters and Science
916-752-0192

The United Kingdom, Japan, Sweden, Norway, Mexico, Brazil, Hong Kong, Costa Rica, Ireland, Egypt, France, Austria, Taiwan, New Zealand, China, Germany, Italy, Korea, Israel, Spain, Kenya, India, Peru, the USSR, Australia, Portugal, Hungary, Togo, Thailand, Denmark, Canada, Indonesia, and Ghana.

An around-the-world itinerary for madcap travelers? No. These are the places where you can study as a participant in the University's Education Abroad Program (EAP). The program continually expands; check with the EAP Office for additional locations available for study abroad.

Most EAP experiences are for undergraduates for an academic year. However, several short-term/special focus programs are offered in a variety of countries. See the "Education Abroad Program" in the Programs and Courses section of this catalog for further information.

Graduate students who have completed at least one year of graduate work at the University and have the support of their department and the Graduate Division are also eligible for some EAP programs.

The primary purpose of EAP is to provide an academic experience in a different educational system. For the most part, UC students abroad live as do students at the host university, attend the same classes, take courses from the same professors, and take part in local social and cultural activities. Full UC unit credit is given for courses satisfactorily completed.

Eligibility requirements include:
• At least 84 quarter units completed by the time of participation
• At least a 3.0 grade-point average for course work completed at UC at the time of application and departure, except for Mexico SFE and Togo SFE programs where the minimum GPA requirement is 2.0
• 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 specific requirements
• An academic plan approved by your major adviser and the campus coordinator
• Endorsement of the Academic Senate Committee on the Education Abroad Program

To help overcome "culture shock" and prepare you for your academic schedule, University of California professors administer intensive language and orientation programs at many of the overseas campus locations. Moreover, should any personal or scholastic problems arise during your study abroad, the faculty members will be there to assist you.

Estimated all-inclusive minimum costs for the nine- to twelve-month program range from $7,000 to $15,000 (varies depending upon the country).

For study abroad during the 1991-92 academic year, the application deadlines are as follows: mid-October for spring semester programs in China and the USSR, and the Japan Peace Studies spring quarter program; mid-November for the United Kingdom and Ireland, Japan, and the spring quarter programs in Mexico and Costa Rica; mid-May for Australia, New Zealand, and the year program 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 make sure that all degree requirements will be met. Consult with your major adviser, 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.

You can obtain informational brochures on other opportunities for study, travel, and employment abroad from the Education Abroad Program Office.
Student Life
LIVING ACCOMMODATIONS

Residence Halls

Information:
Student Housing Office
(916) 752-2009

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 4,500 undergraduates and 178 graduate students do just that. Each of the residence hall complexes is staffed with students and professionals who help create and maintain an environment conducive to personal growth and educational achievement. Over 86 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 applications are received on or before April 1, 1991, are guaranteed residence hall housing as long as they complete all of the instructions which accompany their contracts. All graduate students whose applications are received on or before May 1, 1991, will participate in a lottery for the 178 spaces available in Lysle Leach Hall.

The total room-and-board rate for 1990-91 is $4,655 for a double-occupancy room and $5,110 for a single room (of which there are very few available to new residents). Nineteen meals per week are provided. Rooms are furnished to provide each resident with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board.

If the Davis campus is your choice when filling out your University Admissions Application, the necessary information and applications are mailed to you by the UCD Undergraduate Admissions Office. If you have a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Student Family Housing

Information:
Student Family Housing Office
Orchard Park/Solano Park
(916) 752-4000

There are 476 furnished and unfurnished on-campus apartments for UCD student families. The monthly rates for the academic year 1989-90 were as follows:

- Orchard Park, two-bedroom unfurnished apartment, $963.
- Orchard Park, two-bedroom furnished apartment, $1,386.
- Solano Park, one-bedroom unfurnished apartment, $26.7.
- Solano Park, two-bedroom unfurnished apartment, $303.

Vacancies in Student Family Housing are filled from a chronological list based on the date of application. You should anticipate a wait of at least five months for a fall assignment (may be less at other times during the year). 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
1989-90 ranged from $373 for a one-bedroom unit to $605 for a three-bedroom unit.

**Other Graduate Student Housing**

Information:
The Atriums
(916) 752-7222

The Atriums offer 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 1989-90, monthly rent for a studio was $385 and $528 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 nor 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.

**THE ARTS AT DAVIS**

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

The Department of Music (916-752-0666) sponsors the University Symphony, 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 also sponsors an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures, and who works with music classes and individual students. 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 theatre facilities in California. The excellent faculty and the Granada Artists-in-Residence program (which brings a major British director to the department each quarter), the presence of graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, playwriting, and design, 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); one major special event; Premiere Season (five smaller productions of plays written by students); Studio Season (three smaller productions of established plays); and dozens of class-related projects. These productions are part of the department and serve an important purpose in the study of dramatic art. Participation is open to all students.

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. The Gallery utilizes student employees and interns in operating the facility. 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 unique exhibitions of design-related material. Changing exhibitions are designed with special themes and media that reflect the interests of the design program. Presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Picnic Day Student Exhibition are some of the areas from which shows are designed. The Design Gallery is an innovative gallery 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 1978. 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 of high quality and rich variety 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 student-run **Basement Gallery** (916-752-0105 to leave a message) in the Art Building features art work by undergraduate UCD art majors. The work changes weekly and is hung by the artist with direction from the department peer adviser.

The **C. N. Gorman Museum** (916-752-6567), located in TB 111 (across from 194 Chemistry Building), was established in 1973 in honor of Carl N. Gorman, artist, advocate and former faculty member of Native American Studies on campus. The museum features changing exhibitions of works by contemporary Native American and other ethnic artists. Selections from the permanent collection of art and artifacts are also exhibited on a rotating basis throughout the year.

The Committee for Arts and Lectures (916-752-2523), located in Freeborn Hall, brings a wide variety of touring performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, Arts and Lectures presents concerts
and reciters 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. Date-line, a weekly campus newspaper published by the News Service Office (916-752-1930) and Special Events, a monthly flyer distributed by the Campus Events and Information Office (916-752-1920) list upcoming activities. Bulletin boards, kiosks, the student radio station KDVS, and the California Aggie also advertise programs and local events.

RECREATIONAL FACILITIES AND PROGRAMS

No matter what your recreational bent—horseback riding, an outdoor adventure, music listening, arts 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 UC Davis 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 by providing campus services and a variety of extracurricular activities. Bring yourself up-to-date on local events by stopping at the MU Campus Information Center in Griffin Lounge on the main 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, Campus Events and Information, and Student Activities and Judicial Affairs can be found on the third and fourth floors of the MU tower. Freeborn Hall is a recently renovated 1,250-seat assembly hall used for dances, performing arts, banquets, lectures, and conferences. The Arts and Lectures Office and the Campus Box Office, where you can purchase tickets for campus events and cash checks, are in Freeborn.

Outdoor patios furnished with wooden benches and umbrella tables offer an inviting open-air seating environment.

In addition to the overall operation of Memorial Union facilities, professional and student staff of the Memorial Union and Campus Recreation office coordinate the following facilities and programs:

The Craft Center in the South Silo, a new center for student activity, is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or passes may be purchased 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, silk-screen printing, welding, leatherworking, and stained glass. More information can be obtained by calling 916-752-1475/1730.

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 an extensive volunteer program has been designed to 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 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. Print sales, special programs, and lectures are sponsored by the Gallery, 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 library of albums 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 with pro shop, billiards room, video arcade, lounge, snack bar, and storage lockers. The Games Area conducts bowling leagues, classes, clinics, and tournaments for all ages from beginning through advanced skill levels. The facility is wheelchair accessible. Details are available by calling 916-752-2580/1730.

Outdoor Adventures, in the Bain on the corner of California and Hutchison, is a valuable resource center for planning your outdoor excursions and developing your outdoor skills. Rental equipment of professional quality is available as well as resource information from an up-to-date library of topographic maps, trail guides and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, white-water rafting, kayaking, sea kayaking, boardsailing, 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 916-752-1730.

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 916-752-1955/1730.

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 southwest 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.

The Silo Union expansion is nearing completion while the Memorial Union is in the midst of a major expansion to meet the needs of our growing campus. If you have questions about these facilities or would like to make a reservation, contact Campus Events and Information at 916-752-2813.

Two special programs of the Memorial Union, the MU
Campus Information Center and Leisure Education Programs, promote balanced, healthy living. Through information and referrals, the Center links people and their interests with appropriate resources. The Center is open weekdays from 8:00 a.m. to 5:00 p.m., or call 916-752-2222. Leisure Education Programs offer a variety of presentations on personal balance and well-being as well as recreational opportunities available on campus. Presentations are available for your group by calling 916-752-1730.

Recreation Hall
Information:
Entrance 1B
916-752-6073

Recreation Hall is a multi-use arena available for intramural and informal recreation play, intercollegiate athletics, physical education classes, sports clubs, and special events. The tri-level facility has locker rooms; a flat running track; an equipment room; handball, racquetball, wallyball, and squash courts; a weight room with free weights, universals and a self-guided circuit training concept that utilizes hydraulic machines; main court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance.

Students can use Rec Hall facilities by showing their current, valid photo ID card. Nonstudents may purchase a privilege card at the 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 6:00 a.m. to midnight throughout the academic year.
Numerous special events sponsored each year by the ASUCD, Entertainment Council, and the campus are held in the 8,600-seat Recreation Hall.

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 Segundo 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)
915-752-3500 (Intramurals and Club Sports)

Intercollegiate athletics, intramurals, and club sports programs collectively 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 thirty-seven sports with 2,100 participants per year, while the intramurals program provides competition in thirty-six sports and serves approximately 14,000 participants.

**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. From the fees paid to the University each quarter, The Regents allocate $23.50 per student to ASUCD to support the organization and its many activities. Graduate and professional students may have access to all ASUCD activities and services by paying the fee although certain services are available to these students by their participation in the Graduate Student or Law Student Associations. 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 Universitywide 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 researching 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 liaisons 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** is comprised 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 fifty 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 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, **Student Viewpoint** evaluation of professors and classes, Just Your Type word-processing service, the Bike Barn repair services, travel service, free legal advice, and the Coffee House in the Memorial Union. 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, **The Third World Forum** newspaper, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, and Picnic Day. ASUCD also cooperates with Associated Students 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.

### STUDENT ACTIVITIES

Information:
**Student Activities**
4th Floor, Memorial Union
916-752-2027

There are over 250 registered student organizations at UCD which represent a wide variety of student interests, 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: 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. They include African American Family Festival, 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 is a group of talented and enthusiastic dancers, stunt team members, and gymnasts who travel and perform with the band.

The Danzantes del Alma is a performing dance troupe that seeks to perpetuate Chicano and Mexican culture through the traditional music, dance and costumes of Mexican folklore. All interested students are invited to participate in the troupe.

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 also serves as a resource for conflict resolution and it 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 in the registration process. 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, forgery, theft, vandalism, hazing, and alteration or misuse of University documents, records, keys, or identification. Disciplinary sanctions which may be involved 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 Responsibility
You are responsible for compliance 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, receive transcripts of record, or diplomas until you have met all University obligations.

GRADUATE STUDENT ASSOCIATION (GSA)
Information:
Room 253, South Silo
916-752-6103

GSA is the officially recognized student government for UC Davis graduate students. GSA is a vital communications network which links graduate students from all corners of the campus to other graduate students and to the UCD administration. GSA provides a place for discussion of any issue affecting graduate student academics or quality of life. Every graduate program should have elected or designated GSA representatives. For GSA to advocate graduate student concerns effectively, input is needed from the graduate student body. GSA provides advocacy, services, and information to all graduate students, but in turn, needs your participation.

General Assembly meetings are held once a month and are open to anyone interested in attending. Each year several graduate students are elected to the GSA Executive Council in a variety of positions to carry out the policies and/or functions of the organization. A small portion of your registration fees is used to support the activities of GSA. Please find out about your student organization by calling or visiting the GSA office.

ADVISING AND COUNSELING
In many ways, good advising is as important as good teaching. Several sources of advising and counseling—both academic and personal—are available to students at Davis. You may never need some of these services, but you will be missing out on some important opportunities if you don't give them a try.

Advising Services
Information:
1st floor, South Hall
916-752-3000

Advising Services coordinates the student service groups listed below. Professional staff and more than 70 student advisers are available to help you with your immediate concerns and with plans and possibilities for your future.

Academic Peer Advising places peer advisers in over forty 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 108 South Hall, 916-752-3000.

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 1-3 unit course listing, and other valuable resources. Pregraduate 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. to 4 p.m. throughout the academic year. (TB 98, across from the Chemistry building, 916-752-2807 for information or 916-752-3323, the advising hotline.)

The Orientation and Summer Advising Office provides coordination for the Summer Advising and Registration Program, Fall Quarter Orientation activities, Preview Day, and many other student assistance and orientation programs for new students. The staff seeks to help students learn about the campus environment, procedures, and opportunities, and to offer 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 108 South Hall, 916-752-3000.

The Pre-Business School Adviser, 359 Kerr Hall (916-752-6512 or 916-752-3000), is a student peer adviser who can assist you in seeking information about graduate school programs 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. There is a useful library of business school catalogs and an informational handbook available.

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. Advisers are available through the main Advising Services office, 108 South Hall. 916-752-3000.

The Pre-Law Advising Office is the place students interested in legal careers 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. Many seminars and workshops are also held each year to provide students with more information for preparation for law school and a legal career. The pre-law adviser may be contacted in 108 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.

Associate Dean of Students
Information:
1st Floor, South Hall
916-752-2019

The Associate Dean of Students provides advising, referral and program development to meet the needs of undergraduate and graduate students, particularly women students. The Associate Dean intercedes with faculty, academic, and Student Affairs administrators on behalf of students in academic or personal difficulty; interprets policies and procedures for students and parents; and works with schools, academic administrators and individual faculty to assist students in meeting UCD academic requirements. This office also provides leadership and influences policy and program development in the administration of activities related to the special needs of women and graduate students.

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

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems which affect their academic progress and sense of well-being. Assistance is provided through a network of programs at three campus locations: North Hall, Cowell Student Health Center, and The House. All services are funded through student registration fees. Counselors help students manage their personal concerns and appropriately face
difficult and challenging situations. Students are encouraged to develop their personal insight, interpersonal skills, and strength of character.

A variety of counseling services is available to meet the needs of a large, diverse student population. A multi-disciplinary staff from the fields of psychology, psychiatry, and social work provide short-term individual and group counseling, crisis intervention, consultation, and referral. In addition, career interest inventory, personality testing, and information about graduate school admissions tests and the Planned Educational Leave Program are offered. Two peer counseling programs, The House and EOP/SAA Information Office, provide professionally supervised peer counseling and referral services.

To make an initial appointment, students can 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

TB 16
24-Hour Hotline: 916-752-2790
Business Line: 916-752-5665

Located in a green, two-story house next to the Housing Office, The House is a peer counseling program of the Counseling Center. The setting provides an informal environment where students can receive confidential support, information, and referrals regarding personal or interpersonal problems. The facility is staffed by well-trained student volunteers and is professionally managed. Peer counselor training is offered on a quarterly basis. Applications are available at The House.

Students can receive assistance through individual peer counseling and a wide variety of workshops and support groups. Students are always welcome to come in and enjoy the quiet atmosphere, free tea and coffee, and tours of The House. 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.

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

Information:
313 North Hall
916-752-3472

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; coordinating EOP/SAA new student orientation programs; as well as serving as liaison to staff, faculty and administrators. The Office's multicultural peer staff is particularly sensitive to differing social, cultural, and ethnic concerns and serves as a valuable resource to students. 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.

EOP/SAA Tutoring (Learning Skills Center, The Basement, South Hall, 916-752-2013) 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 skills 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) (Learning Skills Center, The Basement, South Hall, 916-752-2013). New EOP/SAA students (freshmen and transfers) 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 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
- Test-taking
- Test anxiety reduction and many more...

In addition to the above areas of assistance, the Center provides individual tutoring sessions to students on academic probation or subject to dismissal. Group and drop-in tutoring is 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 which 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, from 8 a.m. to 5 p.m. Come in and inquire about our services, which are free to all UC Davis students.

**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, every new full-time student and every full-time student who returns after an absence must 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. Applicants 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.

The services of the Health Center are available to student’s dependents on a fee-for-service basis. Also a Health Insurance Plan for your spouse and children may be purchased at the Health Center.

**Health Insurance.** Graduate, professional, and international students have a mandatory insurance plan that is purchased 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 5:00 p.m., Monday through Friday.

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

**Drink Responsibly in College** (916-752-6335) — 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 on nutrition, exercise, stress management, eating disorders, and other wellness issues.

**Peer Counselors in Sexuality** (916-752-1151) — Information on birth control, pregnancy, sexually transmitted diseases, sex roles and other sexual issues.

The Health Education Program is located in the Student Health Center. Call 916-752-9652 for more information.

**International Student Services (SISS)**

Information:
- Services for International Students and Scholars
- 300 South Hall
- 916-752-0864

UC Davis currently has a community of over 2,300 international students and scholars, from approximately 90 countries, who are studying, teaching, and doing research in a variety of fields. Assistance to this varied group is provided by the staff of Services for International Students and Scholars.

The functions of the SISS Office are to assist incoming international students and scholars in making preparations to come to the U.S., to provide orientation to the campus and community upon their arrival in Davis, to assist them in maintaining their legal status while at UCD, and to facilitate the international transfer of funds in order to maintain their academic endeavors. In addition, immigration, personal, cultural, and financial advisement is provided.

Before fall quarter registration, a special orientation program is held for new international students. The program provides assistance with registration, class enrollment, housing, cultural orientation and immigration regulations as well as introduction to campus services and community resources. All new and transfer international students are required to attend this program.

Careful budgeting is essential for international students. A minimum allowance of $17,500 per year for a single student is recommended to cover nonresident tuition and fees, and living expenses. A married student must budget an additional $2,500 per year for a spouse and $1,000 for each child accompanying the family.

The University of California, Davis expects the international student to be responsible for the above costs. Prior to admission, the student must complete the Certification of Finances form certifying availability of funds for twelve months. It is important to note that tuition and fees may be increased without advance notice.

The international student should be cautioned that there will be numerous initial expenses during the first few months including cleaning and rent deposits for housing, telephone installation costs, bedding and cooking utensils, etc.

No financial aid is awarded by the University to international students during their first year of study. After the first year of attendance, very little financial aid is available to international students, and it is probable that in the near future, no aid will be available to them. Therefore, international students must be prepared to pay their expenses for the entire length of their stay at
Students must report to Services for International Students and Scholars as soon after their arrival as possible. This office can help with immediate needs, make introductions to the Davis international community, and assist students and scholars in locating other individuals from their home countries.

**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 the UCD community with information and programs on the educational, career, and personal needs and interests of women. The WRRC’s services are wide-ranging and include:

- Workshops, lectures, forums, conferences, and events on issues of particular interest to women
- A library containing books and other research materials on subjects related to women and gender.
- A free monthly newsletter, Women’s Writings
- Classes in communicating with confidence
- Peer- and professionally-facilitated discussion groups
- Information on mental health, health care, employment, housing, campus and community events, marital problems, legal rights, legislation, child care, sexuality, and other issues
- Original research on gender roles and women’s concerns
- Competitive grants for student research on women or gender
- Research consultation (assistance with designing and conducting research on women and gender roles)
- Assistance in obtaining academic credit; help in finding faculty members to sponsor 198, 199, and 299 courses

The Center is staffed by friendly, knowledgeable professionals and student interns. You are encouraged to drop by and talk with the staff. Student internships are available in legislative work, publicity, program planning, and research.

**Student Employment**

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

Need a part-time job to get through school? Do you sometimes need a few extra dollars for a special weekend event? Are you looking for work experience related to your major? If so, the Student Employment Center can help you.

The 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. The Center also coordinates the College Work-Study Program for financial aid recipients.

A variety of employment opportunities are offered 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 a.m. to 4:00 p.m.

**Career Planning and Placement**

Information:
The Internship and Career Center
2nd floor, South Hall
916-752-2655

Worried about your career plans? Do you know what kind of job you want when you graduate? Or are you one of the many students unsure about the career you want after graduation? If so, the advisers in The Internship and Career Center (ICC) can help you.

If you are an undergraduate, graduate, or alumnus, The 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 or longer, an adviser can also give you information about internship opportunities.

Some of the resources you can find here include:

- The quarterly Working Times publication which lists information about The ICC’s On-Campus Recruiting Program
- Quarterly schedule brochure of Center workshops and events
- Individual career advising and group seminars
- Workshops on resume writing, interviewing, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- System of Interactive Guidance and Information (SIGI), self-help computerized guidance system which aids in values clarification and career decision making
- A manual for job-seekers
- Listings of current job vacancies
- Internship opportunities (applied work experiences) in all career areas
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 the Placement Manual, prepared by the ICC, 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 Center solicits and maintains job vacancy listings, arranges employment interviews, and schedules on-campus recruiting by employers.

Don’t wait until you are a senior—about to be thrust into the job market—before thinking about your career interests. Visit the Internship and Career Center early—you’ll be way ahead later. Advisers are available on a drop-in basis or by appointment.

Human Corps Program
Information:
The Internship and Career Center
227 South Hall
916-752-3955

Human Corps is a student community services program. Public service work can be a rewarding and satisfying experience which may also improve your 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.

Education and Graduate Placement Services

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:

- 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.

STUDENT SPECIAL SERVICES

Information:
South Hall
916-752-2007

Student Special Services coordinates a collection 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
916-752-3194 Voice/752-6170 TTY

If you have a physical, communication, or learning disability, you may find the advice, assistance, and specialized resources available from the Disability Resource Center very useful. Services are also available to students with temporary disabilities. The goal of this program is to help students with disabilities achieve maximum participation in campus life.

Academic and mobility resources for registered students with verified disability needs include the following:

- Funding and assistance to hire aides for instructional reading, writing, research and other access needs
- Sign language interpreting and notetakers
- Advice on compensatory strategies and alternative test formats for learning disabled students
- Specialized educational equipment—a reading machine, braille printers, tape recorders, and television aids for visually-impaired students; amplification equipment for hearing-impaired students
- Instruction in adaptive computer technology through our “High Tech Center”
- Priority registration and enrollment in classes
- Campus transportation services
- Minor repair services for wheelchairs and other specialized equipment
- Equipment loans for emergency needs, including tape recorders, electric carts, and wheelchairs
Information on Section 504 of the Rehabilitation Act of 1973

- Referrals for disability documentation, tutoring, sources of devices, accessible public transportation, etc.

Counselors can help you with disability management strategies and career choices. You can also find assistance in obtaining financial aid to meet disability needs. Advising is available to assist with issues such as housing options, attendant recruitment and management, and independent living.

Campus accessibility is excellent: practically all instructional, recreational, and student facilities are wheelchair-accessible. Accessible on-campus housing is available, as well as a campus map showing physical accessibility features. The campus is flat and has a good curb ramp system. Ease of mobility, plus special class scheduling methods, can ensure that you'll make it from one class to another on time. Accessible buses link the campus with the community of Davis.

Preadmission counseling is available to individuals with disabilities. You are encouraged to contact DRC if the circumstances of a disability prevent you from demonstrating your ability to do university work or completing the subject or examination requirements for admission.

Transfer/Reentry Student Services

Information:
- Transfer Student Services: 916-752-2200
- Reentry Student Services: 916-752-2005
160 South Silo

Transfer Student Services directly serves enrolled students who have transferred from other institutions of higher education. It provides information and assistance to ensure students an easy and smooth transfer to the University. It coordinates transfer student matters among existing student services units. It also sponsors special receptions and workshops for new transfers, links them to second-year transfers, publishes an annual Transfer Guide of available services and provides assistance to members of the Transfer Student Association.

Reentry Student Services directly serves enrolled students who have reentered the university after several years of life and work experience. It provides information and referral assistance using the Reentry Resource Network. The Network is composed of representatives from existing student services units, colleges, and divisions who are designated to assist reentry students (e.g., Women's Resources and Research Center, Financial Aid, Student Housing, the Dean's Offices, etc.). It also sponsors special programs for new reentry students and provides assistance to members of Advocates For Reentry Students.

Veterans Affairs

Information:
- Veterans Affairs Office
  160 South Silo
  916-752-2020

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.

TRANSPORTATION

Parking. Individuals who park a vehicle (including a motorcycle or moped) on the Davis campus 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 per day and may be obtained from permit dispensers located in lots 1, 5, 25, 30, 47, 49, 50, 54, and 81. Long-term permits are required for all other parking lots, and may be purchased at the 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 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 Medical Center, Research Park, and university facilities on Chiles Road.

Buses. Unitrans, seven bus lines operated by the Associated Students, serves the campus year round. Full service is provided each UCD school day (Mon...
day 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. Finals and break schedules are available during the last week of classes each academic quarter. Schedules are available at the MU Information desk, bus terminals, City Hall, Chamber of Commerce, Post Office, and Unitrans office.

Ridesharing. Ridesharing is encouraged. Information on transportation alternatives to the Davis campus is available by calling 916-752-MILE or by visiting the Transportation and Parking Services Office located on Extension Center Drive. Information may be obtained on the following topics: carpooling and vanpooling (registered pools receive reduced parking rates as well as preferential parking), public transit, commuter match assistance, and shuttle systems.

CHILD CARE PROGRAMS

Seeking assistance with child care? The following programs are available on campus and in the community to assist students in meeting their child care needs.

- The Community Housing Office distributes child care publications, coordinates child care information and referral services among a network of satellite campus units, and serves as the University's liaison with Kids On Kampus, Russell Park Child Development Center, and the City of Davis Child Care Services Program. For further information, contact Community Housing, 101 Student Housing Office, or telephone 916-752-2483.

- The UCD Registration Fee Child Care Subsidy Program assists full-time students with partial child care subsidies. Spouses must also be students or employed full-time. Parents can choose from licensed family day care providers and child care centers. For additional information, call City of Davis Parks and Community Services at 916-756-3747 or drop by 23 Russell Boulevard.

- The City of Davis Parks and Community Services Department provides free child care resource and referral information. The program is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. Up-to-date information is maintained on licensed family day care homes, in-home providers, child care centers, child care co-ops, playgroups, and other family-related services. Additional services include parenting workshops and handouts, a parenting resource library, and a book and toy lending library. It is located at 23 Russell Boulevard, telephone 916-756-3747.

- Kids On Kampus and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Both serve infants through school-age children. Reduced rates are given to residents of Russell Park, Orchard Park, and Solano Park student family housing. Information about Kids on Kampus can be obtained at 916-753-8716, and the telephone number for Russell Park Child Development Center is 916-753-2487.

- The Financial Aid Office can assist students who are parents and who qualify for financial aid with allowances for dependent children (food, clothing, housing, basic medical costs), direct child care costs (in-home provider or child care center charges), and unanticipated medical expenses. This office is in 113 North Hall, 916-752-2390.

- The Early Childhood Laboratory is a teaching and research facility associated with the Human Development Program. 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. Student families pay lower tuition than do UCD staff, faculty, and community-based families. The laboratory is located on campus, and the office is in TB 117, telephone 916-752-2888.

- For those living in on-campus Student Family Housing, parent associations in Orchard and Solano Parks sponsor low-cost cooperative playgroups. Morning sessions are held in each area for children ages two to five. Participation is limited to Student Family Housing residents. For further information or referral, telephone 916-752-4000, Orchard Park/Solano Park, Student Family Housing Office.

- The Perfect Tender infant care cooperative serves six infants under twelve months of age for no fee. Participation is limited to School of Law student parents while they are attending classes throughout the academic year. Contact 916-752-0243 for additional information.

ALUMNI ASSOCIATION

Information:
The Alumni Center
Guilbert House
112 "A" Street
916-752-0286

Toll free in California 1-800-242-GRAD

In choosing the University of California, Davis as your university, you are making a lifelong commitment...you will be identified with the Davis campus for the rest of your life. After graduation you will continue your association with UCD through membership and participation in the Cal Aggie Alumni Association (CAA).

The Association and its alumni members have aided the Davis campus through support and sponsorship of many activities and programs including the Alumni Scholarship Program, Homecoming, Picnic Day, legislative relations programs, student recruitment, career networking, and the student loan fund. In addition, the Association maintains a professional staff dedicated to meeting the needs of UCD’s more than 88,000 alumni.

Another exciting program includes area alumni chapters from Taiwan to Washington, D.C. The area chapters are led by local alumni boards who plan many activities for alumni including social, educational, family, and recruitment programs. So no matter how far away from Davis your life takes you, you can still be part of the UCD pride and spirit.

Each graduate of UCD is important. Membership in the CAAA is only $30 per year. Members are afforded the many special programs and benefits of the Association. Call the Alumni Center for more information or drop by before you graduate and join the UC Davis network.
Fees, Expenses and Financial Aid
FEES AND EXPENSES

It is extremely important to consider carefully 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.

While the needs and resources of each student are different, the following information will give you an idea of the basic expenses students at UCSD will incur. Legal residents of California are not required to pay tuition at the University. Students classified as nonresidents must pay tuition of $1,972 per quarter. (See the Appendix for the Statement on Legal Residence.)

At the time of registration each quarter, every student must pay the following fees:

UNDERGRADUATE STUDENT FEES

University registration fee................... $ 214.00
Memorial Union fee.......................... $ 28.50
Associated Students fee...................... $ 23.50
Optional undergraduate health insurance fee** $ (113.00)
Education fee‡.............................. $ 301.00

Total for California residents................. $ 567.00
Tuition for nonresidents........................ $1,972.00
Total for nonresidents........................ $2,539.00

GRADUATE STUDENT FEES*

University registration fee................... $ 214.00
Memorial Union fee.......................... $ 28.50
Graduate Student Association fee†............ $ 4.50
Health Insurance fee (fall 1990 rate)........ $ 80.00
Education fee‡.............................. $ 301.00

Total for California residents................. $ 628.00
Tuition for nonresidents........................ $1,972.00
Total for nonresidents........................ $2,600.00

These fees are for the 1990-91 academic year and are subject to change without notice.

* Students in the School of Law should refer to the School announcement for explanation of fees.
† Students in the Schools of Law, Medicine, and Veterinary Medicine are not included (see the explanation of fees following).
‡ Students approved for enrollment on a part-time basis are required to pay only one-half of the Education Fee and one-half of the Nonresident Tuition Fee.
** A voluntary health insurance plan will be available to all undergraduates except for foreign undergraduate students who must pay the Graduate Student Health Insurance fee.

Additional Fees and Expenses

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

Parking (per year): $108 to $180 for cars, depending on the type of permit; $36 for motorcycles; $48 for nighttime only 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.

Late payment registration fee ($50)

Changes in class schedule after announced deadline ($3, each petition)

Transcripts ($3 a copy)

Diplomas can be mailed to an address left with Office of the Registrar (fee varies with current mail costs)

Applications for readmission, Planned Educational Leave, or intercampus transfer ($40)

For details concerning fees and deposits, consult the publication 1990-91 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

(Fees are subject to change without notice.)

Explanation of Fees and Expenses

University Registration Fee: $214.00 per quarter for undergraduate and graduate students; $321.00 per semester for law students. Revenue from this fee is used to support a portion of the cost of student services programs including cultural and recreational services (MU and Rec Hall), counseling and advising services, career planning and placement services, student organization and activities services, Learning Skills Center services, and health services. The health services portion of the fee can be treated as a medical expense deduction from income tax.

Education Fee: $301.00 per quarter for undergraduate and graduate students; $451.00 per semester for law students. Revenue from this fee is used for financial aid and related student programs.

Nonresident Tuition: $1,972 per quarter, $2,958 per semester for law students (see the Statement on Legal Residence in the Appendix).

Memorial Union: $28.50 per quarter; $42.75 per semester for law students. Paid by all students. This fee includes the student facility fee. Revenue from this fee is used toward planning and future expansion of student facilities on campus.

Associated Students Fee: $23.50 per quarter. All undergraduate students, both full-time and part-time, are represented by the Associated Students of the University of California, Davis (ASUCD). Graduate and professional students may receive access to all services and activities by paying the fee (see also Graduate Student Association Fee following).

Graduate Student Association Fee: $4.50 per quarter. Paid by all academic graduate students, including students in the Graduate School of Management, but not mandatory for professional students in the Schools of Law, Medicine, and Veterinary Medicine. Professional students may have access to the same services and activities by paying the fee.

Graduate Student Health Insurance Fee: Estimated at $80.00 per quarter for fall 1990 and at $96.00 per quarter for winter and spring 1991. For law students, $120.00 is estimated for the fall 1990 semester and $144.00 for the spring 1991 semester. Paid by all graduate students, including students in the Graduate School of Management and the Schools of Law, Medicine, and Veterinary Medicine, unless comparable coverage can be demonstrated or the student is eligible for a fee remission. Fee remissions are granted to certain teaching and research assistants. This fee is also paid by all undergraduate foreign students.
Undergraduate Health Insurance Fee: $113 per quarter. Undergraduate students may purchase a voluntary health insurance plan during enrollment. Decision on a mandatory health insurance plan for undergraduates is pending.

Law Student Association Fee: $5 per semester.

Costs for a Year at UCD
The Financial Aid Office estimates that in 1990-91 the average expenses of a single UCD undergraduate living off campus will total $9,000, including $1,676 for fees, $636 for books and supplies, $3,114 for housing, $1,275 for food, $1,710 for personal expenses, and $679 for transportation.

Estimated expenses for other single students living off campus are: graduate students, $9,575; Graduate School of Management, $9,907; Law, $9,690 to $9,789, depending upon the year in school (first, second, etc.); Veterinary Medicine, $9,758 to $11,155, depending upon the year in school (first, second, etc.); Medicine, $10,160 to $14,196 depending upon the year in school.

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

The costs 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.

FEE REFUNDS
If you have to withdraw before the first day of instruction, you must fill out and return a "Cancellation of Registration" form to the Office of the Registrar, along with your validated I.D. Card. After the first day of instruction, you must fill out a "Petition for Withdrawal" and follow the same procedures.

Refund Procedures
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:
1-14 days ................ 80%
15-21 days ............. 60%
22-26 days ............ 40%
29-35 days ............ 20%
36 days and over ...... 0%

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 will be refunded 100% of this fee. After the first day of instruction, no refund of the Health Insurance fee will be issued. Any questions regarding the refund of this fee for withdrawals should be directed to the Student Health Center.

FINANCIAL AID
Information:
Financial Aid Office
113 North Hall
(916) 752-0390 (TDD 752-3244)

DEADLINES
January 1- Applications for grants, loans, work-study and California Student Aid Commission awards for 1991-92 must be filed with a processor during this filing period for priority consideration
March 1 Deadline for filing applications for fellowships and graduate scholarships for 1991-92 with the Graduate Division
The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants, and work-study employment.

To ensure priority consideration, file your application for the 1991-92 academic year as soon as possible after January 1, 1991. The priority filing deadline is March 1, 1991. 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. Application instructions for prospective undergraduate students are in the UC Undergraduate Admissions and Financial Aid Packet. The Student Aid Application for California (SAAC) is available at local high schools, community colleges, and the Financial Aid Office. Continuing UCD students and prospective graduate students should obtain the SAAC and "Financial Aid—How to Apply, 1991-92" 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 UCD Scholarship Office, 207 North Hall, (916) 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 the Graduate Division. Eligibility for state graduate fellowships is based on grade-point average, test scores, and financial need. Awards are applied directly toward fees. A SAAC must be submitted to a processor by March 1, 1991.

Eligibility for most assistance is based upon demonstrated financial need. (Most scholarships are not need-based.) Eligibility is determined by the following formula: 1) the student is assigned a standard budget reflecting the average costs for a student attending UCD; 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.

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

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.

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.

Pell Grants are federally-funded awards. All undergraduate financial aid applicants are required to apply for a 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 for a Pell Grant 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). All parts of the SAR must then be submitted to the UC Davis Financial Aid Office. The amount received depends on 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 by following the instructions in the financial aid application packet.
always includes a long-term, low-interest loan. Repayment of these loans 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 6 months after graduation or withdrawal

**Perkins Loans** (formerly National Direct Student Loans) are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student’s need because of demand and limited funds. 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.

- $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)

**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 maximum for veterinary medicine and first-year medical students
- $3,333 maximum for medical students in the second-, third-, or fourth-year
- 5 percent interest
- Repayment begins 12 months after receipt of the degree or withdrawal

**Stafford Student Loans** (formerly GSL) are available through banks and other lending institutions. These loans are based on financial need. Interest accrued while the student is in school is paid by the federal government.

- $2,625 maximum per year for freshmen and sophomores, $4,000 maximum per year for juniors and seniors, to $17,250 maximum cumulative indebtedness for undergraduate students
- $7,500 maximum per year to $54,750 maximum cumulative indebtedness for graduate students
- 7-9 percent interest (may change on short notice)

- Repayment begins 6 months after graduation or withdrawal

**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)
- $80,00 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 9 months after completion of formal training, including accredited internship and residency programs or withdrawal

**Parent Loans to Assist Undergraduates (PLUS) and Supplemental Loans to Assist 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 of (1) dependent undergraduate students or (2) dependent graduate and professional students may borrow $4,000 per year to a maximum aggregate of $20,000 for each dependent student
- Independent undergraduate students or graduate and professional students may borrow up to $4,000 per year to a maximum aggregate of $20,000
- There is no interest subsidy for this loan
- Repayment begins 30 after loan disbursement

**Short-Term, Emergency, and Teaching Assistant Loans** are designed to meet temporary or emergency financial needs of registered students. Loan funds are provided by UCD alumni, ASUCD, the Cal Aggie Foundation, The Regents of the University of California, and private donors.

- Short-term loan: $300 maximum; 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 5 months.
- Emergency loan: $100 maximum; payment is due in 30 days. Available on a drop-in basis, Monday through Friday, 10:30 to 11:30 a.m. and 2:00 to 3:00 p.m.
- Teaching assistant loan: students who are in the teaching assistant, research assistant, associate-in, and postgraduate researcher classifications can apply for a maximum of one month’s salary before and during Fall Quarter. The maximum repayment period is six months.
- The application for a Short-Term, Emergency, or Teaching Assistant Loan is available in the lobby of North Hall. For more information or to schedule an appointment, call (916) 752-6470, 10 a.m. to 12 noon and 2 to 4 p.m.
Work-Study
The College Work-Study Program enables students to earn part of their financial aid through part-time employment. To participate, you must first receive Work-Study as 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 College Work-Study (see below).

Federal Work-Study 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., must carry at least a half-time academic course load, and must 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 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 on and off campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require skills ranging from entry level to highly technical. For further information, see “Student Employment” in the Student Life section of this catalog.

SCHOLARSHIPS AND AWARDS
Information:
Scholarship Office
207 North Hall
(916) 752-2093

At UC Davis a special effort is made to recognize exceptional students. Approximately 150 different undergraduate scholarships are administered by the Scholarship Office, and many more scholarships are handled through outside agencies.

Scholarships are awarded on the basis of academic excellence and exceptional promise. 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 is based on letters of recommendation, test scores, and a personal essay in which your University goals and objectives are stated. Some awards may be 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 a UC Davis scholarship application from the Scholarship Office in October. These applications are due in mid-December. Announcement of winners is usually made beginning in mid-April.

Graduate students are also eligible for various scholarshps and fellowships.

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. The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. 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.

- $500 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 sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UCD scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 916-752-0543.

- 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
APPLYING TO UC DAVIS

The key to preparing a successful application is supplying us with accurate, complete, and timely information.

The first step in applying for admission is to select a major or area of interest within a college that best suits your academic goals. To assist you in this choice you will find an overview of undergraduate studies listed within each College section. The second step is to determine the admission category to which you belong. (See Explanation of Application Categories further on in this section.) This is a very important step because entrance requirements and filing dates may vary depending on your category of admission. The third step is to obtain and complete the Undergraduate Application for Admissions and Scholarship, returning it during the appropriate filing period. The final step is to arrange to have all supporting documents—official test scores and transcripts—forwarded as early as possible.

A summary of the steps in the application procedure appears on the next page. Use the checklist and application instructions to follow your application through the admissions process.

On the application form there is a question that allows you to request information on financial aid and housing. Once your admissions application has been submitted you should keep in contact with the Financial Aid, Scholarship, and Student Housing Offices since admission to the University does not automatically include the awarding of financial aid, scholarships, or housing.

The Disability Resource Center encourages applicants with a physical impairment to identify their disability on the application and discuss in the essay how it has affected their education. Contact that office for further information concerning admission or assistance if needed.

The Academic Reentry Program offers assistance to undergraduate applicants age 25 or older and to graduate applicants age 30 or older.

Office of Relations with Schools/EOP Outreach Services

Information:
2826 Chiles Road
916-757-3108

The Office of Relations with Schools/EOP Outreach Services is the University’s link with secondary schools and community colleges within the state. Services and programs provided by the office include:

• Visiting schools to provide information about UCD to prospective students, counselors, school administrators, teachers, and parents
• Presenting conferences to acquaint the public with University programs
• Developing and distributing publications describing UCD’s programs and academic majors

• Coordinating information about course equivalencies and credit between the community colleges and UCD
• Administering a recruitment program designed to attract underrepresented and low income students to the University

The Educational Opportunity Program/Student Affirmative Action (EOP/SAA) is a major effort of the Office. These special programs in the junior high schools, high schools, and community colleges are aimed at encouraging students from underrepresented groups to become eligible for regular admission to the University.

Programs include the Early Academic Outreach Program in the junior high schools and high schools; the Immediate Outreach Program in the high schools and community colleges; and Upward Bound, a pre-college motivational program in the high schools. The office also sponsors summer residential programs on the Davis campus to give students the opportunity to experience the diversity of University life through residence hall living, special classes, trips, and lectures.

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. 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.

4. 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.

5. High school applicants to the fall term should make arrangements to take the SAT or ACT and three Achievement tests by no later than December. We strongly encourage that these tests be completed by the November test date.

6. Respond to Undergraduate Admissions Office requests for additional information, such as transcripts, test scores, or confirmation of work in progress. 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), therefore it
is important to make arrangements for these requests if you want to avoid delay in the processing of your application.

7. If you are admitted, keep your admission letter for your records.

8. Return your "Statement of Intent to Register" (SIIR), "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 SIIR so your registration materials can be ordered before you register.

VISITING THE CAMPUS
Information:
Information Services Office
129 Mrak Hall
916-752-0639

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. No appointment is necessary. 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 Mrak Hall at 11:30 a.m. and 1:30 p.m. No appointment is necessary.

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-F" 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. You should learn to read analytically and critically, actively questioning yourself about the author's intentions, viewpoint, arguments, and conclusions. You should also 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 which 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 that stress expository writing; the development of persuasive critical thinking on the written page.

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, and 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 which requires either calculus or statistics, you should expect to take that course during your first year at the University.

You should 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.

The ability to use algebra to solve problems 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 undergraduate studies for which mathematics is a prerequisite.

Finally, you should take advantage of any guidance your high school may offer in study skills. 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.

APPLICATION PROCEDURES
The UC Application System

Students seeking admission to the University of California are able to have their applications considered simultaneously at more than one campus.

Under this system, you submit one application to the University indicating the campuses or campuses you wish to attend. A copy of the application is then forwarded to each of the campuses you list. For information regarding the filing fee, consult the application packet.

Undergraduate application packets may be obtained from any California high school, community college, or University of California Admissions Office. Complete the application materials following the instructions included in the packet. Communications concerning admission to the UC Davis campus should be sent to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis 95616.
A nonrefundable application fee must accompany your application. Please make your check payable to The Regents of the University of California. If you have applied previously and were ineligible, or if you were admitted previously and did not register, you are required to file a new application for the quarter for which you seek admission and submit a new application fee.

Initial filing dates are the same for all UC campuses and are listed below. All applications will be considered if filed during the priority filing period. The Davis campus may continue to accept applications beyond the initial filing period, however, after the priority filing period, some departments or colleges may close to new applicants as enrollment quotas are filled. Once a department or college has closed, any additional applications which are received will be notified of alternatives on other UC campuses by the Undergraduate Application Processing Service.

The initial filing periods for new applicants are as follows:

<table>
<thead>
<tr>
<th>Quarter of Attendance</th>
<th>Filing Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall quarter 1991</td>
<td>November 1-30, 1990</td>
</tr>
</tbody>
</table>

An applicant seeking admission to the Winter Quarter may not attend fall sessions at schools whose fall term begins before the beginning of Winter Quarter at UCD.

An applicant seeking admission to the Spring Quarter may not enroll in any school for the Spring Semester immediately preceding the UCD Spring Quarter.

Delays in notification can be avoided if you complete the application accurately, include your essay and filing fee, and arrange for official transcripts (including course work in progress) and official test scores and other supporting documents to be sent to the Undergraduate Admissions Office as soon as they are available. High school students should not forward transcripts unless requested by the Undergraduate Admissions Office. Because advanced standing eligibility depends upon the final outcome of quarter or semester course work in progress, this office must receive a final official transcript of all work completed before you may register.

Transcripts and Test Scores

Transcripts and other documents submitted during the application process become the property of the University and cannot be returned or forwarded to another institution or UC campus. Please note that it is your responsibility to arrange for official transcripts to be forwarded and to ensure that they arrive promptly. It is also useful to have unofficial transcripts sent to you to retain for counseling purposes.

You must submit an official final transcript including a statement of graduation, a Certificate of Proficiency or a General Education Development (GED) certificate. Freshman applicants (see "Explanation of Application Categories") are also required to submit official results of their SAT or ACT tests and three Achievement Tests. (Fall quarter freshman applicants must complete all tests by the December test date in order to be given priority in the admissions process.)

If you have attended or are attending another college when you apply, you must have final official transcripts of all college-level work, as well as your high school transcript, sent directly to the Undergraduate Admissions Office.

Addition of Campus Choice

If, after submitting your application, you wish to add a campus or campuses to those listed on your application, you may do so for a fee, if the campus(es) you
Admission

wish to add is (are) still open to new applications. Contact the Admissions Office at the new campus(es) for their application status. If your application can be included, submit a request to the Undergraduate Application Processing Service in writing, stating your full name, social security number, application ID number, college, major, and term for entrance, and include the additional application fee and your signature.

Processing an addition of campus choice takes several weeks; however, your admission priority will be assigned based on the date your request for an addition is made. You should be aware that special program commitments, such as the EOP/SAO or UCLA’s Academic Advancement Program, may vary from campus to campus.

If you desire housing or financial aid information, you should contact the “added” campus housing and financial aid offices about the campus’s priorities, deadlines, and availability of financial aid and housing.

Notification

After submitting your application materials you may be wondering,

- Has the University received my application forms?
- Will I be considered for admission at my preferred campus?
- Will I be admitted to the University?

The University will mail you a notice acknowledging receipt of your application; upon completion of a review of your academic records, you will be notified of your admission status.

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 February 1 and mid-March. 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 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.

Acceptance of Admission

When you receive your notification of admission you will also receive an important form called the “Statement of Intent to Register” (SIP). You must complete the form and return it to this 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. Interchange transfer, EOP, and readmission applicants (see Explanation of Application Categories below) are not required to submit the $100 advance deposit; however, they will pay full Registration fees at the time of registration.

EXPLANATION OF APPLICATION CATEGORIES

An undergraduate applicant is a student who wishes to complete a program of studies leading to a Bachelor of Arts (A.B.) or Bachelor of Science (B.S.) degree.

A freshman applicant is a student who has graduated from high school or who has earned a Certificate of Proficiency or a General Education Development Certificate, but has not enrolled since high school attendance in a regular session of any collegiate-level institution (with the exception of summer session
An advanced standing (transfer) applicant is a student who has been registered in a regular or extension session of a college or university since high school graduation.

An intercampus transfer applicant is an undergraduate student who is currently, or was previously, registered in a regular session at another campus of the University of California and has not since been registered in another (non-UC) collegiate institution.

An intercampus transfer reentrant applicant is an undergraduate who was formerly registered at UC Davis, then registered at another UC campus, and is now transferring back to UC Davis from a UC campus. This student follows the filing deadlines established for readmission applicants and applies as a readmit through the Davis campus Office of the Registrar.

An Educational Opportunity Program/Student Affirmative Action applicant is a low-income, disadvantaged, or underrepresented student who may or may not meet the standard admission requirements for freshman or advanced standing status.

A readmission applicant is a student who was formerly registered on the Davis campus, who has interrupted the completion of consecutive quarters of enrollment and who is not currently participating in the Planned Educational Leave Program.

A reentry applicant is an undergraduate student aged 25 or over or a graduate student aged 30 or over who has had a significant break in education.

A limited status applicant is a college graduate (or near-graduate) who is not a candidate for an advanced degree, but who has the limited objective of enrolling in certain courses on the Davis campus.

A special status applicant is any person 21 years of age or older who is prepared, by reason of special attainment or background, to undertake limited course work toward a specific objective.

A part-time status student is a person who wishes to complete a degree at UC Davis on a part-time enrollment basis.

Employee-student status is for a UC career employee who wishes to work toward a degree through the Employee Reduced Fee Program.

A second baccalaureate applicant is a college graduate who seeks an additional bachelor's degree. Approval is granted only to students who have completed their educational objectives and are applying for a major that has no enrollment restrictions.

An international applicant is a student who is not a U.S. citizen, immigrant, or refugee.

A concurrent enrollment applicant is someone who wishes to fulfill an academic interest or to test academic ability by enrolling in a limited number of regular University courses on a space-available basis. Such work may be used for admission consideration and for later meeting degree requirements. A concurrent student is enrolled but not admitted to UC Davis.

This program is offered through University Extension and does not require the applicant to meet regular admission requirements.

A graduate applicant is a college graduate who wishes to complete a program of studies leading to an advanced degree, i.e., the master's or doctorate. See the Graduate Division section in this catalog.

A professional school applicant is a student who has completed the requirements necessary for admission to one of the professional schools on the Davis campus (Law, Management, Medicine, Veterinary Medicine). Please see the appropriate sections in this catalog for specific information.

UNDERGRADUATE STUDIES

Undergraduate studies at the University of California, Davis, are divided into three colleges: Letters and Science, Agricultural and Environmental Sciences, and Engineering. When you apply for admission to Davis, make an application to one of these colleges. The three colleges differ in their educational focuses and in the major programs they offer.

The College of Agricultural and Environmental Sciences focuses on seven areas of concentration: animal science; plant sciences and pest and disease management; food, nutrition, textile, and consumer sciences; applied economic and behavioral sciences; resource sciences and engineering; environmental studies; and biological sciences. The College of Engineering focuses on the curricula in the engineering sciences. The College of Letters and Science curricula encompass the humanities, including the arts, and the social, physical, and biological sciences. They enable the student to pursue fundamental knowledge and to learn those basic intellectual disciplines which lead to a liberal education.

Major programs are listed in each college section.

ENTRANCE REQUIREMENTS

The University's undergraduate admission requirements are based on two principles:

- The best predictor of success in the University is high scholarship in previous academic work, and
- The study of certain subjects in high school gives you a good preparation for University work and reasonable freedom in choosing a specialized area of study.

Undergraduate entrance requirements are based upon these general principles but vary in specific details, depending upon the type of admission you are seeking. If you are planning to apply as an advanced standing student it is important to remember that your high school record will form part of the basis for our evaluation of your qualifications and therefore an official copy of it must be submitted. Listed below are the requirements for all undergraduate admission categories.

ADMISSION AS A FRESHMAN

To be eligible for admission to the University of California as a freshman, you must meet specific Subject, Scholarship, and Examination Requirements.
Subject Requirement

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 to be taken in the last two years of high school. The required course sequence is often referred to as the "A to F" pattern.

Courses taken in the 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.

(Note: A year course in high school constitutes one unit.)

A. History—1 unit

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

B. English—4 units

Four years of English—composition and literature (university preparatory in nature, 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 units

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 unit

A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade.

E. Foreign Language—2 units

Two years of one foreign language. Any foreign language with a written literature and emphasis on the development of aural and oral skills may be used. (Courses taken in grades seven and eight may partially satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. College Preparatory Electives—4 units

Four units in addition to those required in "A" through "E" above, to be chosen from at least two of the following subject areas. Elective courses should involve considerable reading and aim to develop analytical and reasoning ability and skill with written and oral exposition.

- 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.
- Foreign language: 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 are acceptable in fulfillment of 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);
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, 3); or
- California State University and Colleges English Equivalency Test (a “pass for credit” only).

The requirement may also be satisfied with a 3-semester or 4-quarter unit transferable college-level English course with a grade of C or higher in literature, composition, or speech.

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 compute the grade-point average for admission, except that the grades earned in the third year of mathematics required under the "C" requirement (intermediate algebra) will be used only if they improve the applicant's grade-point average.

Two of the four units in elective courses used to satisfy the "F" requirement must be completed with a grade of C or better, and all four units must be accepted by the high school for graduation. The best grades
earned in any two of these units taken in grades ten through twelve will be used in computing the applicant's grade-point average for admission.

If you attain a grade-point average of 3.30 (where the letter grade A=4, B=3, and C=2, and in honors or advanced placement courses taken during the eleventh and twelfth years—limit of four year-long courses—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 be eligible to enter the University regardless of your scores on standardized tests. If your grade-point average falls below 3.30 but higher than 2.77, you will be eligible for the University by achieving the specified scores on the standardized tests (see the Eligibility Index on the following page). If you are a nonresident applicant, your grade-point average in the required subjects must be 3.40 or higher.

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 once.

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, you should 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 over 3.30, the tests are required but your scores will not be used to determine your eligibility.

The accompanying table is an eligibility index. If your grade-point average in the “A to F” requirement is less than 3.30 you should refer to this table to see what examination scores you must earn to be eligible for University admission.

<table>
<thead>
<tr>
<th>Grade Point Averages</th>
<th>SAT† Total Scores</th>
<th>ACT* Composite Scores</th>
</tr>
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<tbody>
<tr>
<td>2.78</td>
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*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.
Admission by Examination Alone

If you do not meet the scholarship and subject requirements for admission and have completed fewer than 12 quarter or semester units of transferable college work since high school graduation, you can qualify for admission as a freshman by examination alone. (If you have completed transferable college courses, College Board tests cannot be taken in academic subjects covered in those courses.) You must take the same tests as those described above and receive a total score of at least 1100 on the Scholastic Aptitude Test, or a score of 26 on the American College Test. Your total score on the three Achievement Tests must be 1650 or higher with no score less than 500 on an individual Achievement Test. If you are a nonresident applicant, your score on the three Achievement Tests must be 1730 or higher.

Examination Arrangements: Make arrangements to take the required Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to The College Board, 1947 Center Street, Berkeley, CA 94704. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not the University.) UC Davis's College Board code is 4834 and the ACT code is 0454.

ADMISSION TO ADVANCED STANDING

An advanced standing transfer applicant is a student who has been registered in a regular or extension session of a college or university since high school graduation, excluding the summer immediately following high school graduation. An advanced standing student may not disregard his or her previous college records. Official transcripts from all previous colleges or universities must be submitted to Undergraduate Admissions. This Office determines an applicant's status by looking at courses that are transferable to the University. Courses accepted for admission may not be accepted by the Dean of your college for meeting breadth, major, General Education, or degree requirements.

Admission Requirements

The requirements for admission to advanced standing will vary according to your high school record. If you have fewer than 84 transferable quarter (56 semester) units, you may be required to submit a SAT examination score to establish your high school eligibility on the eligibility index. Transfers with more than 12 quarter or semester units are not required to submit achievement test results. In any case, if you have completed fewer than 12 units since high school graduation, the examination requirements for freshman applicants also apply. If you are a nonresident, you need to meet the additional requirements as described later in this section under Nonresident Applicants.

The transcript you submit from the last college you attended must show, as a minimum, that you were in good standing and that you had earned a grade-point average of 2.00 or better. If your grade-point average fell below 2.00 at any one college you attended or you are not in good standing, you may have to meet additional requirements in order to qualify for admission.

As an advanced standing applicant you must also 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 eligible to transfer 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. Beginning fall 1989, all transfer 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 Eligibility Index score but you have not completed one or more of the "A to F" subjects while in high school, you may be admitted 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 subjects, you may be admitted after you have:
1. established an overall grade-point average of 2.40 or better in another college or university;
2. completed 84 transferable quarter (56 semester) units of credit in college courses; 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 in English; and one in either U.S. history, a laboratory science, or a foreign language, all with grades of C or better. The mathematics component must at least be equal to algebra, geometry, and advanced algebra. A course for which advanced algebra is a prerequisite, including statistics, will satisfy the entire requirement. Courses on the application of statistics to particular disciplines (i.e., business statistics) may not be used to satisfy this requirement. Courses other than mathematics must be transferable to the University.

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 which 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 for freshman and transfer applicants for fall 1990 are described in this section. In the paragraphs following are the standards used by UC Davis to develop the selection procedures.

The selection criteria described below are only for applicants for the fall 1990 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.

Freshman Applicants

All freshman applicants are ranked using an academic index based upon the following components: the high school grade-point average, which is calculated on all academic courses completed in the subject areas specified in the University’s eligibility requirements (the a-f subjects); scores on required tests—the Scholastic Aptitude Test or the American College Test, and the College Board Achievement Tests; and the number and content of courses successfully completed in academic subjects beyond the minimum specified in the University’s eligibility requirements.

University-approved accelerated, Advanced Placement, and honor courses are considered in the context of the overall GPA. The index consists of the sum of 1,000 times the high school grade-point average (capped at 4.00), plus the SAT Verbal and SAT Math scores (maximum 800 points each), plus the three required College Board Achievement test scores (maximum 800 points each), plus 50 points for each academic course successfully completed beyond the minimum specified in the university’s eligibility requirements (maximum 800 points). Freshman applicants are assigned a selection score derived from the following formula:

\[(1,000 \times \text{GPA} \text{ [capped at 4.00]}) + (\text{SAT Verbal}) + (\text{SAT Math}) + (\text{three Achievement scores}) + (50 \times \text{Number of additional A-F courses})\]

The maximum selection score of 8,800 is derived as follows:

\[(1,000 \times 4.0) + (800) + (800) + (800) + (800) + (800) + (800) = 8,800\]

Academic Criteria. Academic criteria are used to select 60 percent of admitted students. Applicants are selected on the basis of the score achieved in the academic index described above.

Supplemental Criteria. Supplemental criteria are used to select 40 percent of admitted students. The academic index is used as the basis for selection, with consideration of additional factors, including intended major, strength and range of college preparatory courses, personal accomplishments and qualities, special circumstances, ethnic identity, gender, and location of residence.

Advanced Standing Applicants

Academic Criteria. The admission of advanced standing applicants is based on completion of aca-
ademic course work, level at entry, and the type of college/university from which they transfer. Davis administers a Transfer Admission Agreement (TAA) that provides priority admission for upper division transfers from 40 California community colleges. In addition to the TAA group, all other eligible junior level transfers from other California community colleges are given highest priority for admission. The following groups are then considered in priority order: upper division transfers from other University of California campuses, and from other four-year California and non-California institutions. If space permits, lower division transfers from other four-year California institutions are admitted if they have superior grades.

Supplemental Criteria. The same supplemental criteria described above for freshman applicants are used.

SPECIAL PROGRAMS AND ADMISSIONS CATEGORIES

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

The Educational Opportunity Program/Student Affirmative Action is designed to assist and provide opportunities in higher education for students from underrepresented ethnic groups (American Indian, Black, Chicano, and Latino), students with a disability, and students from economically and/or educationally disadvantaged backgrounds. The program offers assistance with the admission application process in addition to providing academic, social and cultural support. (See also under Advising and Counseling in the Student Life section.) An admissions 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 a special-action freshman or advanced standing student who has not met the admission requirements but who has demonstrated 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.

Academic Reentry Program

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but has demonstrated recent academic potential, has special talents, or a disadvantaged educational history may be considered for admission by special action. (See also under Advising and Counseling in the Student Life section.)

Second Baccalaureate Status

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 Colleges of Engineering and Letters and Science.

**Limited Status**

Students in limited status are those whose special attainments qualify them to take certain courses in the University toward a definite and limited objective. To apply for limited status admission you must either have a bachelor’s degree but not be a candidate for an advanced degree, or have completed a substantial amount of college work with a satisfactory grade-point average. You 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. You must also submit transcripts from all schools attended. Fees and filing dates are the same as those for new applicants.

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

**Special Status**

The special status classification is designed 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 Colleges of Engineering and Letters and Science.

**Nonresident Applicants**

A nonresident applicant for advanced standing who meets the admission requirements for freshman admission must have a grade-point average of 2.8 or higher in college courses that are accepted by the University for transfer credit.

If you lack any of the required high school subjects, and are a nonresident, you must complete college courses in those subjects with a grade of C or higher. If you graduated from high school with less than a 3.4 grade-point average in the subjects required for freshman admission you must have completed at least 84 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or higher. Upon successful completion of that work, you may have the requirement for two units of the required high school subjects waived.

**Intercampus Transfer Status**

If you are currently registered as an undergraduate student or have been registered on another campus of the University of California, and have not subsequently registered at another institution, you may apply for an intercampus transfer to UC Davis. Applications are available from any local high school, community college or UC campus. The nonrefundable application fee must be submitted with your transfer application. Filing dates are the same as those listed for regular applicants (see Calendar at the front of this catalog).

**International Student Status**

Applicants from other countries will be admitted in accordance with the general procedures governing nonresident admission. An international application may be obtained by writing the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, California, 95616. Applicants who are not United States citizens, immigrants, or refugees, must return this application with the nonrefundable application filing fee. It is very important that the application be filed during the appropriate filing period. Applications received after the first month of the priority filing period will be processed as space permits.

Prior to admission, the Financial Certification Form is required to demonstrate the availability of $17,500 for the first year’s study. Adequate funding is required for the remaining years in the United States until the academic program is completed. Prior to registration, the signed Statement of Responsibilities for Privately-Funded Students, or the Statement of Responsibilities for Sponsored Students is required.

For applicants whose native language is not English or whose schooling has not been in the English language, the results of the Test of English as a Foreign Language (TOEFL) are required and must be submitted. To arrange a testing date and location in one’s home country write to the Educational Testing Service, P.O. Box 899, Princeton, New Jersey, 08540. The minimum TOEFL score which will be accepted is 500.

Prior to registration, international students whose native language is not English are required to demonstrate sufficient command of the English language to profit from instruction at the University. A proficiency examination is given at UC Davis during the week before school begins. If students do not pass this examination, they must enroll in English classes for international students—English 21, 22, or 23—until they have acquired the necessary language skills. In addition, students must satisfy the University Subject A requirement.

As part of the application process, applicants are required to submit their secondary school and college records (English translations must accompany all records). These records should include all certificates and transcripts of grades awarded in each subject. Credit will be granted for university studies outside the United States if the course work has been completed in an approved university and is considered to be academically equivalent to course work offered at the
University of California. The Undergraduate Admissions Office will have the final authority for assessing the transferability of credit.

For additional information, look under International Student Services in the Student Life section of this catalog.

**Part-Time 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 enrolled for ten 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. For information on fee reductions applicable to part-time students, see the Fees and Expenses section of this catalog.

**Employee-Student Status**

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter/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.

**Concurrent Enrollment Status**

Concurrent courses are regular University courses open to the community on a space-available basis. The purpose of the program is to allow an individual to pursue academic interests and to test academic abilities at the University.

For information, write the University Extension Office, 1333 Research Park Drive, Davis, CA 95616 or call 916-757-8777.

**For admission to the Graduate Division, Schools of Law, Graduate School of Management, Medicine, or Veterinary Medicine**, see the appropriate sections in this catalog.

**ADDITIONAL INFORMATION**

**Options for Nontraditional Students**

While UCD graduate and undergraduate degree programs are designed primarily for students who can enroll full time on campus, the following programs make it possible for qualified nontraditional students to accumulate credit without enrolling full time:

- For students admitted to UCD:
  - Part-time status
  - Employee-student status
  - Credit by examination

- For admitted and non-admitted UCD students:
  - University Extension courses
  - Summer Sessions courses

- For students who have not been admitted to UCD:
  - Concurrent courses

Preadmission advising is available to nontraditional students through the Academic Reentry Program.

**High School Proficiency Examination**

The University of California will accept the Certificate of Proficiency or the General Education Development (GED) certificate awarded by the State Department of Education, in lieu of the regular high school diploma. However, you must also meet all other University entrance requirements (subject, scholarship, examination). On University records, the date of graduation will be the date of the certificate. Admission by College Board test scores alone is still an option if you were ineligible on the basis of your high school record.

**Advanced Placement Examinations**

The Advanced Placement Examinations of the College Board are taken in conjunction with courses taken in high school. Depending on the examination, you can receive 8 or 4 quarter units of University credit for each examination in which you earn a score of 5, 4, or 3. These credits will apply toward the total required for graduation from the University. See the table on examination advanced placement for course work equivalencies and limitations of credit.

**Credit from Another Institution**

The University gives unit credit to transfer students for courses they have taken at other accredited colleges and universities, including some extension courses. To be accepted for credit, the courses must be consistent with those at the University as determined by the Admissions Office. (Students accepted into the College of Agricultural and Environmental Sciences should refer to that section in regard to petitioning for upper-division courses evaluation.)

California community colleges offer a full program of courses approved for transfer credit. A maximum of 105 quarter units (70 semester units) may be earned toward a University degree at a community college. Subject credit for transferable courses in excess of these units may also be granted to meet University graduation requirements.

Applicants to the College of Agricultural and Environmental Sciences and to the College of Letters and Science who have more than 120 quarter (80 semester) units of credit for transfer must have the approval of the Dean of the College and satisfy University requirements for admission. (College of Engineering applicants should refer to the Engineering section.)
WHEN YOU ARRIVE

Information:
Summer Advising/Orientation Programs
Advising Services
South Hall
732-3000

Starting off on the right foot at UCD is made a little easier by various programs designed to introduce you to the University.

The Summer Advising and Registration Program is a chance for entering students, both freshmen and transfers, to visit the campus for two or three days during the summer. If you are a freshman, your parents are also invited to attend, and a special parents’ program is planned for them. During this program you will have a chance to become familiar with the campus, learn about the services available to students such as financial aid and student advising, take required course placement exams and complete your registration (payment of fees) and enrollment in classes. You will also be able to meet students, professors, and staff members and get some advice about majors, requirements, social life, and answers to questions you or your parents may have. It’s a good way to start out, and Davis won’t seem like such a strange new place in the fall.

Orientation Week, held at the beginning of each fall quarter, offers new and continuing students a variety of activities, special events, and meetings to get the new quarter started. Some of the things that happen include departmental open houses, tours of the campus, concerts and lectures, registration, enrollment, and meetings with deans and advisers. Orientation activities are also held for students entering in winter and spring quarters.

REGISTRATION PROCEDURES

Information:
Office of the Registrar
124 Mrak Hall
916-752-2973

Registration is the means by which you become a student at the University. The registration process includes paying fees, enrolling in classes, 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 submitted your registration forms, had your photo taken (first term of enrollment only), paid your fees, and enrolled in classes. 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 exchange.

If you have not satisfied the Subject A requirement, you must enroll in English A. Consult the current Class Schedule and Room Directory (published about seven weeks before the beginning of the quarter and available in the campus bookstore) for more detailed information.

Study List Unit Limitations

Undergraduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students for insurance and financial aid purposes, or to compete in intercollegiate athletics. The expected study load for graduate students is 12 units per quarter, but 8 units will maintain full-time status.

Undergraduate students who qualify for part-time status may enroll for ten units or fewer per quarter; and graduate students with part-time status may enroll for one-half course load. Employee-students may enroll for up to nine units or three courses, whichever is greater, any given quarter.

Normally, an undergraduate student enrolls for 15 units per quarter; however, you should familiarize yourself with the quarterly minimum-progress requirements. Undergraduate students should refer to College sections for quarterly maximum-unit allowances.

Variable-Unit Courses

Subject to approval by the department chairperson, an instructor may arrange to give a special study course (numbers 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) to interested students. These courses are graded on a Passed/Not Passed basis only. Under special circumstances, an instructor may request from the Academic Senate Committee on Courses of Instruction approval to award letter grades

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**Deadlines**

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<td>Filing period for students who expect to complete work for bachelor’s degree to file an Announcement of Candidacy with the Registrar</td>
<td>May 25-Sept. 14</td>
<td>Nov. 12-Dec. 17 (1990)</td>
<td>Feb. 6-March 22</td>
<td>May 20-June 24 (for Sept. ’91)</td>
</tr>
<tr>
<td>Deadline for students who plan to complete work for a minor program to file applications with their Dean’s Office</td>
<td>Oct. 10</td>
<td>Jan. 18</td>
<td>April 12</td>
<td>July 8 (for Sept. ’91)</td>
</tr>
</tbody>
</table>
(except 92, 192 courses). The request must be submitted by the instructor within the first ten days of instruction of the quarter in which the course is offered. Such requests, however, are not automatically approved.

Credit in Special Study Courses (numbered 99, 194H, 199) is limited to a total of 5 units per term.

Adding or Dropping Courses
You are officially enrolled in all courses listed on your individual study list and will be held responsible for completing each of the courses. You must file an Add-Drop petition in order to add or drop courses after this initial enrollment. Petitions are to be filed with the departments offering courses to be added or dropped.

See the Academic Calendar in the front of this catalog for final dates for filing petitions each quarter, and refer to the appropriate Class Schedule and Room Directory for filing procedures. 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 adviser's approval in order to drop courses. A course which is on your study list and for which you did no gradable work is reflected on your official transcript. A verification of your study list is available at the beginning of the fifth week of each quarter.

Changes of Major, College, or School
With the approval of the appropriate dean or deans, an undergraduate student in good standing can transfer from one area of study to another. Petitions for this purpose may be obtained from the Office of the Registrar (Letters and Science major change petitions are obtained from department offices).

Petitions for a change of college must be filed in the first five weeks of the quarter. Requirements for changing a major in a given college are listed under each college section in this catalog.

Change of Name
Petitions for this purpose 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.)

INDEPENDENT STUDY PROGRAM

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 their special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190-199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:
1. develop, in general terms, a plan of study;
2. locate a faculty sponsor or panel of sponsors, and with their help and approval develop a detailed plan;
3. complete a project proposal form (obtained from the Academic Senate Office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the 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.

For further information contact the chairperson of the Committee on Courses of Instruction, c/o Academic Senate Office.

WITHDRAWALS AND LEAVES OF ABSENCE

Withdrawals may be granted by the University for emergency reasons or for good cause. In order to withdraw, approval must first be obtained from the dean of the student's college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Petitions for Withdrawal Forms are available at the Office of the Registrar. Information on fee refunds can be found in the Fee Refund section of this catalog. Once withdrawal forms are approved, enrolled courses will be dropped automatically. (See below for a planned temporary leave.)

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.

Readmission after an Absence

If you are a former UCD undergraduate student planning to return to the University of California at Davis, you must file an Application for Readmission available in the Office of the Registrar, with a nontransferable, nonrefundable fee of $40. (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have attempted in the interim must be submitted to the Office of the Registrar.

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 1990</td>
<td>August 24, 1990</td>
</tr>
<tr>
<td>Winter 1991</td>
<td>November 30, 1990</td>
</tr>
<tr>
<td>Fall 1991</td>
<td>August 23, 1991</td>
</tr>
</tbody>
</table>

Graduate students applying for readmission should refer to the Graduate Division section in this catalog for filing information.

Planned Educational Leave Program (PELP)

A Planned Educational Leave is defined as a planned interruption or pause in your regular, full-time education during which you temporarily cease formal studies at Davis while pursuing other activities that may assist in clarifying your educational goals. The intent of the program is to make it possible for a student to suspend academic work, leave the campus, and later resume studies with a minimum of procedural difficulties. PELP is not to be used for a medical leave. If you
cannot attend school because of medical reasons, you should request a Petition for Withdrawal available in the Office of the Registrar. (Also see Readmission after an Absence.)

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.

Applicants for enrollment in PELP are required to file an application available at the Office of the Registrar, including a brief written explanation of the reason for leaving the campus, and must state when they intend to resume academic work. Applications for Planned Educational Leave must 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 an 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.) Enrolled courses will be dropped automatically.

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 enroll in concurrent courses on the Davis campus, may not earn academic credit at Davis, and are expected not to enroll in courses at any other institution 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.

SCHOLASTIC REQUIREMENTS

The academic year consists of three ten-week quarters, except for the School of Law which has an academic year consisting of two fifteen-week semesters. Two six-week summer sessions are also offered. Students normally attend the University three quarters per school year, but you may accelerate your progress by enrolling in one or both summer sessions.

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 2/3; from semester to quarter units, multiply by 3/2.)

The way units of credit are assigned to courses is based on the "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 for 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, field trips, and the like. These are not always spelled out completely in the General Catalog. By knowing the amount of work which will be required, you can plan your course-load more systematically and realistically.

Credit by Examination

Under certain prescribed conditions, currently enrolled students in good standing may receive course credit by taking an examination without formally enrolling in a course. You may obtain a petition and a copy of the prescribed conditions from the Office of the Registrar. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied by a fee of $5, 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 the Graduate Division.

The credit received for the examination may not duplicate any credit you have already earned toward your degree. 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 encour-
aged to prepare fully for such an examination before attempting it.

Learning in nonacademic settings can also be validated through credit by examination.

**Enrollment at 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 enrolled 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 enrollment. In those instances in which a variance is granted, units earned are counted toward minimum progress for the term in which the dual enrollment occurs. Summer session courses are exempt from this regulation.

It is possible for students to 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. (There is no provision for auditing in Summer Sessions.)

See the Summer Sessions bulletin for detailed information.

**GRADING**

Every instructor is required to assign a grade for each student enrolled in a course. The following grades are used to report the quality of a student's work at UCD:

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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>C+</td>
<td>2.7</td>
</tr>
<tr>
<td>C</td>
<td>2.3</td>
</tr>
<tr>
<td>B-</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
</tr>
<tr>
<td>NP</td>
<td>0.0</td>
</tr>
<tr>
<td>S</td>
<td>0.0</td>
</tr>
<tr>
<td>U</td>
<td>0.0</td>
</tr>
</tbody>
</table>

The grade-point average (GPA)

The grade-point average is computed on courses undertaken in the University of California, with the exception of courses undertaken 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. I grades are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the University. If you fall below a C average, you are considered "schoastically deficient" (see Scholarship Deficiencies).

**Passed/Not Passed (P/NP) Grading Option**

Subject to regulation by the faculties of the various colleges and schools, an undergraduate student in good standing can petition to take specific courses on a Passed/Not Passed basis. Petitions are available in the Admissions Office and must be filed before the end of the fifth week of instruction.

The grade P is assigned for a grade of C- or better. Units 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. 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. Students who plan to attend graduate or professional school should consult with Advising Services regarding Passed/Not Passed grading.

If you elect the P/NP grading option for courses graded P/NP 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.

A course in which a D or F is received may not be repeated with the P/NP option. Students who received an Incomplete in a course they undertook for a letter grade may not complete the course on a Passed/Not Passed basis.

**Satisfactory/Unsatisfactory (S/U)**

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. 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.

Petitions are available from the Graduate Division and must be signed by your graduate adviser. (See also Individual Study courses.) A course in which a C, D, or F grade is received may not be repeated with the S/U option.

**Passed/Not Passed (P/NP) Grading Only**

In specific courses which have been approved by the respective departments and by the appropriate Committees on Courses of Instruction, individual instructors will assign only Passed or Not Passed grades. Such courses count toward the maximum number of units graded P allowable toward the degree. (See also Special Study courses.)

**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 in successive quarters. (See above for P/NP grading option.)

**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 term 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 term succeeding the term in which the I grade was assigned, the I grade will remain on the student's record.

You may not re-enroll for credit in a course for which an I grade has been assigned. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification. A graduate student who accumulates more than eight units of I grades will be subject to probation.

Incomplete grades will not be included in your grade-point average at the end of a quarter. At the time of graduation, however, any remaining I grades are included when your grade-point average is computed, in order to determine whether you have achieved the 2.0 average required for the bachelor's degree.
An incomplete grade, in these computations, has the same effect as a grade F, NP, or U, depending on what 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 term. No final grade except I may be revised by examination or the submission of additional work after the close of the term.

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.

**Repetition of Courses**

An undergraduate student may repeat any course in which grades of D, F, or NP have been received up to a maximum of 16 units. (Repeat units of English A will not be counted against this maximum.) However, departments may restrict the repetition of a course if it is prerequisite to a course that has already been completed with a grade of C- or better. Repetition of a course more than once requires approval by the appropriate dean in all instances. Courses in which you have received a grade of D or F must be taken for a letter grade if repeated—not on a P/NP basis. (Courses in which a grade of NP was received may be repeated on a P/NP basis.) In computing the grade-point average of an undergraduate who repeats courses in the University in which a D or F was received, only the most recently earned grades and grade points are used for the first 16 units repeated. Thereafter, you will receive the grade assigned and the corresponding grade points earned for each time you take the class. When a course is repeated, the units completed will be credited toward the degree only once, but the course will appear on your record each time it is taken.

A graduate student may repeat any course in which a grade of C, D, F, or U has been earned, up to a maximum of nine units. A course in which a C, D, or F grade has been earned may not be repeated on the S/U basis. In computing the grade-point average of a graduate student who repeats courses in which grades of C, D, or F was received, only the most recently earned grade for each course and corresponding grade points will be used.

**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 registration card to the Office of the Registrar before the end of the term.

**Transcripts**

A record of each student's academic work at UCD is prepared and retained permanently by the Office of the Registrar. Copies of your official transcript may be obtained from that office for $3 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, Davis, CA 95616. Transcripts of work completed at another campus of the University or at another institution must be requested directly from the campus or institution concerned.

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

**CLASS LEVEL**

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

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0–40.0</td>
</tr>
<tr>
<td>Sophomore</td>
<td>40.1–83.9</td>
</tr>
<tr>
<td>Junior</td>
<td>84.0–134.9</td>
</tr>
<tr>
<td>Senior</td>
<td>135.0–</td>
</tr>
</tbody>
</table>

**EXAMINATIONS**

**Final Examinations**

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.

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. The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student enrolled 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.

Students with learning disabilities may be afforded 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.

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 the other students in the class an undue hardship which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the requester's religious creed.

An instructor may release each student’s original examination, or a copy, at any time. Otherwise the instructor will retain final examination materials, or copies thereof, until the end of the next regular term, during which period students may have access to their 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 enrolled 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.

**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 following 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 require-
ments (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 GE courses you have to complete. (See Bachelor’s Degree Requirements chapter.)

In general, you may not earn University credit for courses which duplicate credit already earned through AP. There are, however, some 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.

The information provided in the chart applies to undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. For further clarification consult the office of your college.

**SCHOLARSHIP DEFICIENCIES**

The following provisions apply to all undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. 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 term.

A student will be placed on probation for qualitative reasons if, at the end of any term, the student’s grade-point average (GPA):

- is less than 2.0, but not less than 1.5, for the term.
- 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 term,

- the student’s grade-point average (GPA) is less than 1.5 for the term.
- the student has attempted more than 16 units graded I (Incomplete).
- the student has spent two consecutive terms on academic probation.

The official transcript will in the case of qualitative standards reflect in good standing or not in good standing.

The **quantitative standards**, referred to as **minimum progress requirements**, define scholarship in terms of the number of units that must be satisfactorily completed. 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 fewer than 12 units. The notation “minimum progress—subject to academic disqualification,” will be noted on the grade report the first time the total number of units passed at UCD averages fewer than 12, calculated at the end of every term for the preceding three terms of enrollment. Quantitative standards are not reflected on the official transcript.

Once a student is in good standing and has met quantitative standards for scholarship, the notation will be removed from the transcript.

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

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 term of enrollment just preceding the summer session)
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to term in which examination is taken)
- Courses that are IP (in progress) will be counted as units passed
- Courses graded I will be counted as units passed when replaced by a passing grade (applied to the term 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. Advising assistance should be obtained either through the student’s faculty adviser or in the college Dean’s Office.

**Dismissal**

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which a student is 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
<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>UCD COURSE EQUIVALENCES</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>8 units</td>
<td><strong>English/Humanities Credit</strong></td>
</tr>
<tr>
<td>English</td>
<td>5, 4</td>
<td>English A, 1, 3</td>
<td></td>
<td>Satisfies Subject A requirement.</td>
</tr>
<tr>
<td>English</td>
<td>3</td>
<td>English A</td>
<td>8 units</td>
<td>satisfactorys part of English composition requirement.</td>
</tr>
<tr>
<td><strong>FOREIGN LANGUAGES</strong></td>
<td></td>
<td></td>
<td>8 units</td>
<td><strong>Humanities Credit/Unrestricted Electives</strong></td>
</tr>
<tr>
<td>French</td>
<td>5</td>
<td>French 22</td>
<td>8 units</td>
<td>For each foreign language examination passed.</td>
</tr>
<tr>
<td>French</td>
<td>4</td>
<td>French 21</td>
<td></td>
<td>In the College of Letters and Science, satisfies credit toward Humanities/Unrestricted electives.</td>
</tr>
<tr>
<td>French</td>
<td>3</td>
<td>French 3</td>
<td></td>
<td>In the College of Letters and Science, examinations (except for Latin) satisfy the Foreign Language requirement.</td>
</tr>
<tr>
<td>German</td>
<td>5, 4</td>
<td>German 4, 6A, or 6B</td>
<td>8 units</td>
<td>Satisfies first course toward English Composition requirement.</td>
</tr>
<tr>
<td>German</td>
<td>3</td>
<td>German 3</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Latin (Vergil)</td>
<td>5, 4, 3</td>
<td>Latin 2</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Latin (Lyric)</td>
<td>5, 4, 3</td>
<td>Latin 2</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4</td>
<td>Spanish 5, 4</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>3</td>
<td>Spanish 4</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td><strong>HUMANITIES</strong></td>
<td></td>
<td></td>
<td>8 units</td>
<td><strong>Humanities Credit/Unrestricted Electives</strong></td>
</tr>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>Art 2, 5</td>
<td>8 units</td>
<td>In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>Art Studio</td>
<td>4</td>
<td>Art 2</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Art History</td>
<td>5</td>
<td>Art 1A, 1B, 1C</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>American History</td>
<td>5, 4, 3</td>
<td>History 17A, 17B</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>European History</td>
<td>5, 4, 3</td>
<td>History 4B, 4C</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>5, 4, 3</td>
<td>Music 10</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>5, 4, 3</td>
<td>Biological Sciences 10</td>
<td>8 units</td>
<td>Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5, 4</td>
<td>Chemistry 1A, 1B</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>5, 4</td>
<td>Computer Science 30</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>3</td>
<td>Computer Science 30</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Computer Science A</td>
<td>5, 4, 3</td>
<td>Computer Science 30</td>
<td>2 units</td>
<td></td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4</td>
<td>Mathematics 11, 16A, 16B, or 21A</td>
<td>4 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>3</td>
<td>Mathematics 16A or 21A</td>
<td>4 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>5</td>
<td>Mathematics 11, 16A, 16B, or 21A</td>
<td>4 units</td>
<td>Mathematics 16A or 21B may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>4, 3</td>
<td>Mathematics 11, 16A, 16B, or 21A</td>
<td>4 units</td>
<td>Mathematics 16A or 21B may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>Physics 1A, 1B, 5A, 5B, 5C, 10, Physics 10</td>
<td>8 units</td>
<td>No credit for laboratory parts of Physics 5 or 9.</td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 3</td>
<td>Physics 10</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>Physics CI</td>
<td>5</td>
<td>Physics 1A, 5A, or 9A</td>
<td>4 units</td>
<td>Course equivalents may be used as prerequisite for preceding courses of same series with consent of instructor.</td>
</tr>
<tr>
<td>Physics CI</td>
<td>4</td>
<td>Physics 1A or 5A</td>
<td>4 units</td>
<td>In the College of Engineering, only a score of 5 on Physics (CI and CII) Examinations applies toward Physics requirement.</td>
</tr>
<tr>
<td>Physics CI</td>
<td>5, 4</td>
<td>Physics 1B</td>
<td>4 units</td>
<td></td>
</tr>
</tbody>
</table>

**SOCIAL SCIENCE**

| American Government and Politics | 5, 4, 3                  | Political Science 1 | 4 units | Political Science 1 satisfies American History and Institutions requirement.                                  |
| American Government and Politics | 5, 4, 3                  | Political Science 2 | 4 units | In College of Agricultural and Environmental Sciences, satisfies credit toward Social Science requirement or Unrestricted electives. In College of Engineering, awards credit toward Humanities-Social Sciences electives requirement. |
being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school, or campus.

HONORS AND PRIZES

Deans’ Honors Lists

According to Davis campus regulations, the quarterly Dean’s Honors List is comprised of names of students who have completed, for a letter grade, a minimum of 12 units in a specific term 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 degree during the preceding term. Any additional regulations set by a particular college will be stated within that section of this catalog. Honors Lists will be posted quarterly on bulletin boards outside Dean’s 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.

Graduation Honors

Honors at graduation may be awarded to students who have completed units of credit in the University with a grade-point average which places them in the corresponding top percent of the graduating class of their college or school, as shown in the table below, and who have met additional college requirements:

<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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-89</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
<td>6%</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>

The grade-point averages which mark the cut-off points for each honors category for the June graduating class (namely, winter term grades for candidates for June of each year) will be used as minimum criteria for the award of the same category of honors to students who graduate in the terms immediately following. Grade-point averages for the cut-off points (in the table above) for Winter Quarter 1990 are shown below. These averages will be used through winter 1991.

<table>
<thead>
<tr>
<th>Percent Determining Cut-Off Point</th>
<th>Grade Point Average by College</th>
<th>Letters and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agricultural and Environmental Sciences</td>
<td>Engineering</td>
</tr>
<tr>
<td>2%</td>
<td>3.831</td>
<td>3.892</td>
</tr>
<tr>
<td>3%</td>
<td>3.788</td>
<td>3.843</td>
</tr>
<tr>
<td>4%</td>
<td>3.738</td>
<td>3.795</td>
</tr>
<tr>
<td>6%</td>
<td>3.674</td>
<td>3.706</td>
</tr>
<tr>
<td>8%</td>
<td>3.618</td>
<td>3.634</td>
</tr>
<tr>
<td>12%</td>
<td>3.493</td>
<td>3.537</td>
</tr>
<tr>
<td>16%</td>
<td>3.391</td>
<td>3.471</td>
</tr>
</tbody>
</table>

All students having the same grade-point average as the one that falls at each percent cut-off point will be awarded honors in that category.

Students should refer to specific college sections of this catalog for any additional requirements.

A notation of awards is made on the student’s diploma and on permanent records in the Office of the Registrar.

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.

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)
- Omicron Delta Epsilon (Economics)
- Omicron Nu (Applied Behavioral Sciences)
- 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)
- Prytaneian 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)
Bachelor’s Degree Requirements
Four groups of requirements must be satisfied before a student can become eligible for candidacy for the bachelor's degree. They are:

1. University requirements, which apply to all colleges;
2. General Education requirement, which applies to all colleges;
3. College requirements; and
4. Major requirements.

Detailed information on University requirements and the General Education requirement can be found on the following pages. (See specific college sections for information on college and major requirements.)

**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 which contains their major field.

**College Requirements**

College of Agricultural and Environmental Sciences
- Unit
- Scholarship
- English Composition
- Breadth (in the major)

College of Engineering
- Unit
- Residence
- Scholarship
- English Composition
- Design
- Humanities/Social Science

College of Letters and Science
- Unit
- Residence
- Scholarship
- English Composition
- Foreign Language (A.B. and B.A.S. degrees)
- Area (Breadth) Credit

**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 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 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 "Schedule for Registration and Orientation," published prior to the beginning of each quarter.

If you have not satisfied the requirement in one of the ways described above, you must enroll in English A during your first quarter of residence at the University, or as soon thereafter as space is available in the course. 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 1/2 high school unit in American history and 1/2 high school unit in civics or American government, with a grade of C or better in each course.
- By completing any one of the following courses:
  Afro-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 as satisfied at another campus of the University.
- By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to 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 or school (see appropriate college or school).

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. Enrollment is with the consent of the instructor only.

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 for all courses you have attempted in the University. An exception to this rule is authorized 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 and school requirements consult the appropriate sections of this catalog.

**Filing for Degree Candidacy**

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 Information chapter.

**GENERAL EDUCATION REQUIREMENT**

The General Education Program seeks to promote the intellectual growth of all students in the undergraduate colleges. The program's objectives are: (1) to offer a coherent 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 serious participation in class activities; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

General Education (GE) courses are grouped into three broad areas of knowledge:

1. **Civilization and Culture.** Courses in this area are designed to foster knowledge of the dominant intellectual traditions, achievements, and socio-political institutions of humankind and to stimulate awareness of cultural diversity within the Western tradition and in other civilizations.

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

3. **Nature and Environment.** Courses in this area are aimed at providing students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations, and appeal of science. It is a major goal of the General Education Program that students not primarily interested in scientific disciplines be prepared to read and understand scientific literature addressed to the educated public.

**Fulfilling the General Education Requirement**

The only way that you can fulfill the GE requirement is by completing a required number of approved GE courses at UCD (see the exceptions in the paragraph below). 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 of Davis' GE courses, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

**Transfer Credit.** 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 prior to entry do not count as "transfer credit" for determining your GE requirement. Successful completion of an approved GE course during a UCD Summer Session prior to entry, however, will count toward satisfaction of the GE requirement.

You should 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.

**Determining Your General Education Requirement**

Each academic major 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 which contains your major field.

GE courses may be either introductory or non-introductory. Introductory courses assume no prior knowledge or exposure to the field. Non-introductory courses require some background course work or familiarity with the subject. You should consult the course descriptions contained in the Programs and Courses section of this catalog for the courses recommended as preparation for non-introductory courses.

The specific General Education requirements for students entering UCD from the 1994-95 to 1996-97 academic years and from 1997-98 and thereafter are detailed in the table opposite.
# General Education Requirements

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

<table>
<thead>
<tr>
<th>Student Status</th>
<th>1984-85</th>
<th>1985-86</th>
<th>1986-87</th>
<th>1987-88, and thereafter</th>
</tr>
</thead>
</table>
| Freshman or transfer student with 40 or fewer transfer units | 2 GE courses:  
- may be in same or different areas;  
- may be introductory or non-introductory | 4 GE courses:  
- maximum of 3 in one area;  
- maximum of 2 introductory or non-introductory | 6 GE courses:  
- 3 courses in each of two areas;  
- must have 1 introductory and 2 non-introductory courses in each area | Same as for 1986-87 |
| Transfer student with more than 40 but fewer than 84 units | No GE requirement | 2 GE courses:  
- may be in the same or different areas;  
- may be introductory or non-introductory | 4 GE courses:  
- Option 1: 2 courses in each of two areas:  
  - only 1 course in each area may be introductory  
  - must have 1 introductory and 2 non-introductory courses in the area with 3 courses;  
  - the single course in the other area may be introductory or non-introductory  
- Option 2: 3 courses in one area and 1 in the other:  
  - must have 1 introductory and 2 non-introductory courses in the area with 3 courses;  
  - the single course in the other area may be introductory or non-introductory | Same as for 1986-87 |
| Transfer student with 84 or more units | No GE requirement | No GE requirement | 2 GE courses:  
- may be in the same or different areas;  
- may be introductory or non-introductory | 2 or 3 GE courses:  
- Option 1: 1 course in each of two areas:  
  - both courses must be non-introductory  
- Option 2: 3 courses in one area:  
  - must have 1 introductory and 2 non-introductory courses |

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.

## 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.

### Civilization and Culture (CC)

- American Studies  
- Art History  
- Art Studio  
- Chicano (Mexican-American) Studies (Humanities emphasis)  
- Classical Civilization  
- Comparative Literature  
- Design  
- Dramatic Art  
- East Asian Studies  
- English  
- French  
- German  
- Greek  
- History  
- Italian  
- Landscape Architecture  
- Latin  
- Linguistics  
- Medieval Studies  
- Music  
- Philosophy  
- Religious Studies  
- Rhetoric and Communication  
- Russian  
- Spanish

### Contemporary Societies (CS)

- Afro-American Studies  
- Agrarian Studies  
- Agricultural and Managerial Economics  
- Agricultural Education  
- Anthropology (A.B. degree)  
- Applied Behavioral Sciences  
- Asian American Studies (non-degree program)  
- Chicano (Mexican-American) 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)
Agricultural Science and Management
Animal Science
Anthropology (B.S., degree)
Applied Science
Avian Sciences
Biochemistry
Biological Sciences
Botany
Chemistry
Community Nutrition
Computer Science
Consumer Food Science
Dietetics
Engineering (all majors)
Entomology
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 Science
Psychology
Range and Wildlands
Science
Resource Sciences
Soil and Water Science
Statistics
Wildlife and Fisheries
Biology
Zoology

If you have declared multiple majors where all of your majors are classified in the same area of General Education, you complete the General Education requirement just as you would if you had a single major. If your majors are classified in two or more different areas of General Education, you are required to complete only the appropriate number of courses in the one area of General Education in which you do not have a major.

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 General Education area to which your major is assigned, consult your college dean's office.

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.

Restrictions Applicable to GE Courses
Effective with the fall quarter 1986, there are two restrictions that apply to GE courses.

1. **Letter grading.** 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 1A-1B, 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.

General Education Literature Preparation List
The recommended General Education preparation listed in the course descriptions of some non-introductory courses states "any course from the GE Literature Preparation List." This list consists of the following courses: English 3, Comparative Literature 1, 2, 3, French 25, German 52, and Integrated Studies 2D.

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.

You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster which allows you to substitute introductory for any required non-introductory courses.

**COLLEGE AND MAJOR REQUIREMENTS**

The chart at the beginning of this chapter outlines College requirements in addition to the University and General Education requirements. Detailed information on college and major requirements can be found in specific college chapters which begin immediately after this section. Course requirements are listed under each major program in the Programs and Courses section of the catalog.
GENERAL EDUCATION COURSES FOR 1990-91

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

Introductory
American Studies 1B
Art 1A/1AG1, 1B/1BG1, 1C/1CG1, 1D/1DG1, 25/25G1
Classics 4A, 17A, 17B, 17C, 20
Comparative Literature 1, 2, 3, 5, 6, 7, 12, 13, 25
English 3, 4
French 25
German 48, 52
History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 161A
Integrated Studies 2B, 2D, 3B, 3C, 8B
Italian 50
Linguistics 1
Music 3A-3B2, 10
Philosophy 1, 10B, 10D, 13, 14, 17, 21, 22, 23, 24, 31
Political Science 4
Religious Studies 21, 40
Russian 44

Civilization and Culture

Non-Introductory
Art 178C
Classics 140, 141, 143
Dramatic Art 156, 157
Education 120
French 113, 112, 113, 114
German 110, 113, 115A, 116, 117A, 118A, 118B, 140
Italian 146, 147
Landscape Architecture 146
Medieval Studies 20A, 20B, 20C, 120E
Music 110A, 110B, 110C, 110D, 129
Native American Studies 130A, 130B, 156, 181A, 181B, 181C
Philosophy 18, 101, 102, 105, 107, 108, 151
Religious Studies 18, 141A, 141B, 141C
Rhetoric and Communication 110
Russian 130, 131, 151, 166
Spanish 149

Contemporary Societies

Introductory
American Studies 1A
Anthropology 2, 4
Economics 1A-1B2
Environmental Studies 10
Geography 2-2G1, 5-5G1
History 10
Integrated Studies 3A, 3D, 3E, 8C
Native American Studies 10
Political Science 1, 2
Psychology 15-162
Religious Studies 1, 2
Sociology 2, 3

Contemporary Societies

Non-Introductory
Afro-American Studies 100, 133
Agricultural Economics 120, 141, 141M
American Studies 45, 120, 130
Anthropology 25, 101, 124, 129, 130, 133, 178
Applied Behavioral Sciences 2, 151, 153, 154, 178
Chicano Studies 132
Consumer Science 100
Economics 106
Education 110, 122, 132
Engineering: Civil 160
Environmental Studies 101, 133, 161, 165, 166
Geography 124, 155, 170, 171
History 22, 165, 188B
Human Development 15
International Agricultural Development 10
Linguistics 113
Native American Studies 130C, 180
Philosophy 117
Psychology 175, 177
Resource Sciences 10-10G1
Rhetoric and Communication 152
Russian 132
Sociology 25, 119, 157
Textiles and Clothing 107
Women's Studies 50

Nature and Environment

Introductory
Anthropology 1
Astronomy 10
Avian Sciences 11
Biological Sciences 10
Botany 10
Chemistry 1A-1B2, 10
Engineering 20
Entomology 17
Food Science and Technology 2
Geology 1-1G1, 3-3G1
Human Development 19
Integrated Studies 1A, 1B, 8A
Nutrition 10-113, 20
Philosophy 31
Physics 10
Plant Science 10
Wildlife and Fisheries Biology 10

Nature and Environment

Non-Introductory
Agrarian Studies 2
Animal Science 1, 2
Anthropology 15, 23, 152, 153
Atmospheric Science 10
Avian Sciences 13
Botany 101
Engineering 160
Engineering: Applied Science 137
Engineering: Civil 30
Entomology 111, 119, 153
Environmental Studies 30, 116-116G1
Geology 43, 113, 116-116G, 131, 135, 144
Landscape Architecture 155
Microbiology 20
Philosophy 108
Physics 137, 160
Resource Sciences 2, 3-3G1, 131
Textiles and Clothing 110
Water Science 10, 100
Zoology 138

1 These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.
2 This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.
3 Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).
College of Agricultural and Environmental Sciences
Challenges and opportunities arising from social and technological changes characterize these times. Today's challenges—protecting the environment from humans' diverse activities, improving nutrition in major segments of the population, developing and utilizing human and renewable natural resources—are reflected in the programs and offerings of the College of Agricultural and Environmental Sciences.

Teaching, research, and extension in the College now transcend the traditionally important mission of food and fiber production. Other important missions are the environment, quality of life, and basic biology. Activities range from the soil to the home, from the farms to the cities. The best uses of land and forest areas, as well as the management of water for home, agriculture, wildlife, recreation, and industry are studied. These areas, reflected in the thirty-eight majors in the College, offer interesting and practical career opportunities.

Social and human aspects as well as biological and technological advances are major College considerations. The goal is to develop concern within people; a concern not only with the technology but with the human benefits or problems that such technology might create. Through the application of the biological, physical, and social sciences to resource management, farming, ranching, food processing, business, education, conservation, recreation, the family, and the community, College programs are designed to meet today's challenges and contribute significantly to effective solutions for tomorrow's problems.

**STUDENT RESPONSIBILITY**

In recent years, students' points of view have had a significant impact on both educational programs and College governance. Students participate in designing the College's programs and are included on College, departmental, and general faculty committees that determine a wide spectrum of educational and administrative policies. If you want to take part in the committee system, let us know in the Dean's Office, 228 Mrak Hall.

Student representatives are elected from each major in the Spring Quarter to serve on the Dean's Student Advisory Committee (DSAC). The DSAC meets with the Dean monthly throughout the academic year to discuss issues of concern to students and the College. Subcommittees are established to study special topics and to develop student recommendations on major policy issues affecting the college and/or campus.

Teaching excellence depends on constructive help from all students. As full participants in the educational process, students are expected to provide faculty advisers, departmental chairpersons, and the deans with candid appraisals of College programs. The College also uses questionnaires to evaluate the success of its programs and to determine immediate student reactions to courses and instructors. You are encouraged to communicate with the Dean's Office at any time, in person or by letter, concerning the impact of College programs on your education or ways in which these programs may be improved. Such information is very important in planning to meet the educational needs of future students.

**PROGRAM PLANNING**

**Your Role in Program Planning.** Although many services are provided to assist in program planning, in the last analysis you are the one who determines which program to pursue. The most crucial decision you make in this process is selecting your educational objectives. These may or may not require enrollment in a university. As part of making this decision, you
should investigate the educational opportunities in the College by visiting the campus before applying for admission and talking with the associate dean, faculty members, advising staff, and students. If the University is to be a means of reaching a career decision, you should examine its potential for meeting your goals.

Once you decide to enroll in the College and have chosen an educational objective, be it specific or exploratory, the College's advising services can be of assistance. Our advisers know the resources of the College and the campus and can help you use them to accomplish specific goals. The advisers can, in fact, be called upon long before you arrive on campus. High school students desiring information about college preparatory programs and college students contemplating transfer are encouraged to seek guidance from our deans and faculty advisers as early as one or two years before coming to the Davis campus. This is best done in person, although information can be provided by letter or phone.

It has been the experience of advisers that the college's programs are flexible to serve a student's needs. Recommendations meant to serve as guides are sometimes misunderstood to be hard and fast rules. The phrase "courses normally taken by students" often leads students to believe the courses are specifically required when they are not. In designing a major program individual students should consult their adviser and the General Catalog to find the most suitable courses. Prerequisites to selected courses need to be planned in advance.

Education is a building process. It is difficult or impossible to learn advanced principles without first understanding elementary ones. As a matter of convenience, most students acquire preparatory knowledge through prerequisite courses, but that is not the only route available. If you have acquired the knowledge by other means, you need not take the specified prerequisite. Instructors will often indicate on the basis of informal discussions that you are prepared for advanced study without the need for prerequisite courses. Courses may also be challenged by examination.

Flexibility in planning has also been constrained by the belief that students in one college may not take courses in other colleges. This is not true. Within the boundaries of enrollment limitations and Academic Senate policy—and your ability to acquire useful knowledge as a result of taking a particular course—you may enroll in almost any course listed in this catalog.

**COLLEGE ADVISING SERVICES**

University life is a complicated, sometimes bewildering experience. The College offers a variety of ways that you can obtain advice or help in solving your problems. Each major has its own advising system and students should contact their major department for assistance and/or referral. Some of these services are described in the sections following.

**Office of the Dean**

The Dean's Office is open to students for a variety of services. The professional staff can assist you with many of your academic advising and extra-curricular activities. Its primary functions are:

- Academic advising: advice regarding probation/dismissal status, admission to College, readmission, and second bachelor's, limited, and regular status.
- Action on petitions that require the Dean's approval (e.g., change of major, change of grade, change of status, waiver of minimal progress, late Add/Drop petitions, PELP petitions, Withdrawal petitions.)
- Additional services include: Study Plan clearance; College English requirement check; release of holds on registration packets; evaluation of each student's record for graduation purposes; and a Special Events unit in the College, which is responsible for the College Commencement Program.

**Faculty Advisers**

You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The assignments are made by Master Advisers, each of whom is responsible for coordinating advising within a major. If you have not decided on a specific major, you will be assigned to the Exploratory Program. In this case, you will have a faculty adviser especially familiar with the breadth of course offerings available in this and other colleges. On the other hand, if you have well-defined educational objectives, you will be assigned a faculty adviser with the training and experience required to facilitate your program planning.

The function of faculty advisers is to sensitize students to the educational opportunities at Davis, to discuss the implications of options available, and generally, on the basis of experience, to help students achieve their educational goals. The great potential which a faculty adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your faculty adviser each quarter prior to 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 Centers**

General information on all majors is available at the College's Academic Advising Center, 122 Hoagland Hall, where major advising activities in the College are coordinated. Advising for students in the Exploratory Program and Individual major is also carried out in the Academic Advising Center.

There are also numerous major Advising Centers available to assist you in a variety of ways. They are staffed by Advising Associates who are knowledgeable in all aspects of university and college rules and regulations, courses, specific requirements of their particular major(s), career opportunities, etc.

**Peer Advisers**

Student advisers are available in the College's Academic Advising Center, in other advising centers, and at The First Reson. These peer advisers keep themselves up to date on the "how's," and "where's," and "why's," of University operating procedures. They are prepared to answer a variety of questions about courses, requirements, and enrollment procedures.
and are both a source of information and a means of referral to the right person or office for action.

**Associate Deans of Resident Instruction and Student Affairs**

Associate Deans:
Ericka L. Barrett
Shu Gang
228 Mrak Hall
916-752-0107

The College has two associate deans of resident instruction and student affairs and an advising staff who welcome the opportunity to become acquainted and to talk informally with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

**Orientation Class**

Each quarter the College offers an Orientation course (see Programs and Courses section) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UCD. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

**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 of the College has responded to this need by writing the "Expanded Course Descriptions" giving more detailed explanations about each of its course offerings. 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, the 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 Dean's Office, advisors' offices, advising centers, departmental offices, The First Resort, and in the dormitories at the head residents' offices.

**Internship Courses**

Students who wish to secure credit for an internship must arrange for their credit, through appropriate departments and the Internship and Career Center. (See the College Requirements for unit limitations.)

**MAJOR PROGRAMS**

**Choosing a Program**

There are several alternatives available to undergraduate students in the College of Agricultural and Environmental Sciences:

- A regularly established major program
- An individually designed major program
- A preprofessional program

- The exploratory program eventually leading to one of the first two alternatives

**Subject Areas and Majors**

The majors and special programs in the College are listed below according to Subject Matter Areas. Questions regarding a major should be addressed to the advising centers or the Dean's Office. Complete outlines of these majors and programs are presented in the Programs and Courses section of this catalog.

If you fulfill the requirements for more than one major in the College, that accomplishment can be noted in the memorandum section on your transcript. Requests for certification of multiple majors should be made in the College Office. These additional majors should also be indicated on the Candidacy Card when filing for graduation.

Each major is assigned to one of the three General Education categories (see the Academic Information section): Contemporary Societies (CS), Nature and Environment (NE), and Civilization and Culture (CC). The appropriate category is indicated immediately following the major.

**ANIMAL SCIENCE**

**Majors in Animal Science**

Animal Science (NE)
Avian Sciences (NE)
Wildlife and Fisheries Biology (NE)

Advising Centers:
1149 Meyer Hall, 916-752-6118 (Animal Science only)
3292 Meyer Hall, 916-752-1300 (Avian Sciences only)

**Interdisciplinary Major**

Agricultural Science and Management (NE)

**APPLIED ECONOMIC AND BEHAVIORAL SCIENCES**

**Majors in Applied Economics**

Agricultural and Managerial Economics (CS)

Advising Center:
University House Annex, 916-752-6185

**Majors and Programs in Behavioral Sciences**

Agricultural Education (CS)
Applied Behavioral Sciences (CS)
Design (CC)
Human Development (CS)
Landscape Architecture (CC)

Advising Centers:
101 or 103 AOB 4, 916-752-2244
162 Walker Hall, 916-752-1165 (Design; Landscape Architecture only)

**BIOLOGICAL SCIENCES** (an Intercollege Division)

**Majors in Biological Sciences**

Biochemistry (NE)
Biological Sciences (NE)
Botany (NE)
Genetics (NE)
Microbiology (NE)
Physiology (NE)
Zoology (NE)

Advising Centers:
376 Mrak Hall, 916-752-0410 (Biological Science only)
196 Briggs Hall, 916-752-9696 (Animal Physiology only)
FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES

Majors in Food Sciences
Consumer Food Science (NE)
Fermentation Science (NE)
Food Biochemistry (NE)
Food Science (NE)

Advising Centers:
126 Cruess Hall, 916-752-1468 (Consumer Food Science, and Food Science only)
2607 Chemistry Annex, 916-752-6168 (Food Biochemistry only)
3001 Wickson Hall, 916-752-1909 (Fermentation Science only)

Majors in Nutrition
Community Nutrition (NE)
Dietetics (NE)
Nutrition Science (NE)

Advising Center:
1151 Meyer Hall, 916-752-2512

Majors in Consumer Sciences
Fiber and Polymer Science (NE)
Textiles and Clothing (CS)

Advising Center:
129 Eversen Hall, 916-752-4417

PLANT SCIENCES AND PEST MANAGEMENT

Majors and Programs in Plant Sciences
Plant Science (NE)
Range and Wildlands Science (NE)

Advising Centers:
132 Hunt Hall, 916-752-1715

Major in Pest Management
Entomology (NE)
Advising:
394A Briggs Hall, 916-752-0490

Interdisciplinary Major
Agrarian Studies (CS)
Advising:
2039 Wickson Hall, 916-752-0929

RESOURCE SCIENCES AND ENGINEERING

Majors in Environmental Studies
Environmental Biology and Management (CS)
Environmental Policy Analysis and Planning (CS)

Advising Center:
2134 Wickson Hall, 916-752-3088

Majors in Resource Sciences
Atmospheric Science (NE)
Environmental Toxicology (NE)
Resource Sciences (NE)
Soil and Water Science (NE)

Advising Centers:
122 Hoagland Hall, 916-752-1909
4111 Meyer Hall, 916-752-1042 (Environmental Toxicology only)

Major in Agricultural Engineering
(See College of Engineering)

Interdisciplinary Major
International Agricultural Development (CS)

Advising Center:
101 AOB 4, 916-752-2244

SPECIAL PROGRAMS

Exploratory Program (non-degree program)
College Academic Advising Center:
122 Hoagland Hall, 916-752-0610

Are you unsure what major you really want to pursue? If so, you may wish to register in the Exploratory Program. With the assistance provided by the College's Academic Advising Center and the major advisers and/or Advising Associate in the respective departments and major program offices, you will be able to explore specialization options, develop your decision-making processes, and ultimately select the major best suited to your needs. A major must be declared before you complete 120 units (see Declaration of Major).

For registration purposes, indicate "Exploratory" on your admissions materials. Further information is available from the Academic Advising Center, 122 Hoagland Hall, 916-752-0610.

Individually Designed Major Programs
College Academic Advising Center
122 Hoagland Hall, 916-752-0610

You may design an individual major if you have a specific academic interest not represented by an established major. Such a major requires the selection of interrelated courses totalling 45 upper division units from two or more areas of study. After preliminary consultation about this special program with the major adviser for the Individual major, you then plan your major with at least two faculty advisers. The proposed
program should be submitted to a special committee for review at least four quarters before you plan to graduate.

Additional information may be obtained by contacting the College's Academic Advising Center, 122 Hoagland Hall, 916-752-0610.

**Preprofessional Programs**

Preprofessional training requirements for application to professional schools, such as schools of veterinary medicine, administration, law, or medicine, may be satisfied through programs in the College. You should select an undergraduate major on the basis of individual interest and aptitude; no one major will give you an advantage toward admission. Advisers and/or Advising Associates in the College are well-informed about professional requirements and will help you integrate them into your major program. You can obtain more information by contacting the College Office, 228 Mrak Hall; the Office of the Associate Dean—Student Services, School of Veterinary Medicine, 1024 Haring Hall; the Health Sciences Advising Office, South Hall: Pre-Business School Advising Office, 359 Kerr Hall and the Internship and Career Center; or the Pre-Law Advising Office, South Hall.

**Teaching Credentials**

Inquiries concerning preparation for teaching credentials in Agricultural Education and Agricultural and Home Economics Education should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

For general information on obtaining the teaching credential, see Teacher Credential Programs in the Graduate Division section.

**Student Experimental Farm**

A student farm is available to obtain hands-on experience in crop production and to participate in the sustainable agriculture program. For more information telephone 916-752-7645.

**MINOR PROGRAMS**

Departments in the College of Agricultural and Environmental Sciences may offer optional minor programs. Completion of a minor is not required for graduation. However, when your total educational objectives cannot be met through a major alone, you may wish to complete the requirements for one or more minor programs and have this certified on your records.

Following is a list of approved minor programs within the College. Requirements for each program can be found under the department major offering the minor (in parentheses).

- Aging and Adult Development (Human Development)
- Agricultural Entomology (Entomology)
- Apiculture (Entomology)
- Biological Sciences (Biological Sciences)
- Community Development (Applied Behavioral Sciences)
- Community Nutrition (Nutrition)
- Energy Policy (Environmental Policy Analysis and Planning)
- Entomology (Entomology)
- Environmental Policy Analysis (Environmental Policy Analysis and Planning)
- Environmental Toxicology (Environmental Toxicology)
- Fiber and Polymer Science (Fiber and Polymer Science)
- Food Service Management (Nutrition)
- Human Development (Human Development)
- Insect Ecology (Entomology)
- International Agricultural Development (International Agricultural Development)
- Medical-Veterinary Entomology (Entomology)
- Nematology (Nematology)
- Nutrition and Food (Nutrition)
- Nutrition Science (Nutrition)
- Recreation (Environmental Biology and Management)
- Textiles and Clothing (Textiles and Clothing)

A minor normally consists of a minimum of 18 units of upper division coursework. Only one lower division course may be substituted to meet minimum requirements. Only one course can be used to satisfy a requirement of both your major and your minor. No course can be counted toward minimum requirements for more than one minor program. Transfer units cannot normally be used to satisfy minor requirements. Exceptions in use of transfer units require approval by your adviser for the minor program and the College Committee on Majors and Courses of Instruction. Even though a minor program is not required, you may choose to complete one or more minors in either this college under the guidelines above or the College of Letters and Science according to guidelines in effect for that college.

Satisfactory completion of a minor program must be certified by your major and minor adviser. If you wish to have a minor authorized and entered onto your records, obtain the appropriate form from the Dean's Office, have your minor adviser certify the minor and have your major adviser sign the form, and return the completed form to the Dean's Office. The filing period coincides with that for filing for degree certification (see Academic Calendar in the front of this catalog).

**DEGREE REQUIREMENTS**

It is your responsibility to see that all requirements for graduation are fulfilled. The University and General Education requirements can be found in the Bachelor's Degree Requirements section of this catalog. You must fulfill the Bachelor of Science requirements in a major as prescribed by, or individually designed and approved by, the faculty.

In brief, the College requirements are as follows, including any restrictions in addition to the aforementioned requirements.

**Unit Requirements:** Of the required 180 units counted toward a degree, 54 units must be upper division work. In addition, the following unit limitations apply to all majors:

- Not more than 12 units can be courses numbered 92, 99, 190C, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered
92 and/or 192 (credit will not be given for 192s taken prior to the completion of 84 units)

- Not more than 9 units of professional courses (numbers 300-499) may be used toward the 54 upper division units

**Scholarship Requirement:** As of Fall Quarter 1984, students in the College are required to attain a minimum grade-point average of 2.00 for all courses specified as depth subject matter in the major for the awarding of the Bachelor's Degree. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Committee on Majors and Courses of Instruction and printed in this catalog, or (b) an individual major approved by the Individual Major Committee. The major program must include a specification of Depth Subject Matter in which the degree student will be required to attain an average grade point of at least 2.00.

**English Composition Requirement:** Before you have completed 120 units, you are required to take two courses: either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression. The following UCD courses have been approved for satisfaction of this College requirement:

1. One course must be selected from English 1, 3, 20 or 103 (courses with primary emphasis on writing skills).

2. One course from one of the courses not selected above or from: English 102, 104, Comparative Literature 1, 2, 3, Philosophy 5, 10, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

**Breadth Requirements (in the major):** Each major requires a certain number of units of breadth—Natural Sciences, Social Sciences, and Humanities. These units are specified by the major program. The broadening effect of any particular course is dependent on your major and general interests. (For example, natural science courses would add more breadth to an Agricultural and Managerial Economics major than they would to a Biochemistry major.) Your faculty adviser and/or Advising Associate has guidelines for each major showing what courses you should consider.

**General Education:** A General Education course may simultaneously satisfy the campuswide General Education requirement, preparatory subject matter, a breadth requirement or an unrestricted elective required by your major. You should consult your faculty adviser and/or Advising Associate 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 enrolled at UC Davis. If you have transferred to UCD from another postsecondary institution of higher education (i.e., community college, 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 enrolled 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.

**Filing for Graduation:** You must file a Candidacy Card with the Office of the Registrar during the specified filing periods (see Academic Calendar). You must also see your faculty adviser and/or Advising Associate and complete your **Major Certification** (see appropriate college section). This form must be received and evaluated by the Dean's Office before your candidacy for a degree can be finalized.

**Filing Degree Certification:** 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.

### COLLEGE POLICIES AND PROCEDURES

#### 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 Advising Associate, 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 the student's individual 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). Your adviser and/or Advising Associate will then notify the Dean that you have filed your plan.

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 a student plans to graduate. At that time, the adviser and/or Advising Associate 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.

#### Declaration of Major/Change of Major

Students who have not declared a major must do so by the time 120 units have been acquired. Failure to
declare a major at this point will result in a hold on your further registration. In order to declare a major, you must meet with your faculty adviser and/or Advising Associate, fill out a Change of Major petition obtainable at the Office of the Registrar or Dean's Office, and file the petition with the Dean's Office. If you have completed 120 units you must prepare at the same time a study plan with your adviser and/or Advising Associate. You are accepted into a major only after both your adviser and/or Advising Associate and the Dean have approved the Change of Major petition.

**Within the College.** You may change from one major to another within the College by obtaining approval from a faculty adviser and/or Advising Associate of the new major you have selected and the Dean. Admission into a major program may be denied or deferred if your grade-point average in courses that are required for the selected major or your overall grade-point average is below 2.00. Procedures for changing a major within the College are the same as those for declaring a major (see above), and the same conditions apply.

**Accompanied by Change of College.** Petitions for a change of major involving change of college should 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 and/or Advising Associate 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 less than 2.000 in courses that are required by the new major.

**Multiple Majors**

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. 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.

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 another 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.

**Passed/Not Passed Option**

This 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 and/or Advising Associate before electing to take a course Passed/Not Passed.

**Credit in Extension Courses**

Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement provided written approval has been obtained from the Dean prior to enrollment. Units of credit allowed by the Dean may be less than the number of units listed for a course. No grade points are assigned for courses completed through University Extension.

**Transfer Students**

If you transfer to UCD from another institution, the Admissions Office will determine the unit credit you will be awarded for previous work. The College evaluates the credit awarded by the Admissions Office and determines how many units will be counted as upper division work. Your faculty adviser and/or Advising Associate then determines how the credit applies toward completion of the major requirements.

In order to make program planning easier for transfer students, the major requirements listed in the Programs and Courses section of this catalog have preparatory subject matter set out in a special category. These preparatory courses may be taken at the University of California or elsewhere. You can generally determine the area of knowledge covered by a specific requirement by reading the course descriptions. You need not present identical courses, only ones that have substantially similar content. If you are attending
a community college, consult your counselor to determine which community college courses are appropriate and acceptable for fulfilling College of Agricultural and Environmental Sciences requirements.

If you have questions as to the best way to prepare for transfer to the Davis campus, you are encouraged to write directly to the Dean’s Office or the Advising Center responsible for your intended major or plan a visit to the campus to discuss your program with a faculty adviser and/or Advising Associate. Simultaneous enrollment at another institution requires prior approval by the Dean of the College.

Withdrawal

A student may be permitted to withdraw from the College for emergency reasons or for good cause. Consultation with the Dean’s Office is required prior to filing the petition to withdraw. Also refer to the University policy and procedures for withdrawal.

HONORS

Dean’s Honors List

The Dean’s Honors List, published at the end of each quarter, includes the names of all students in the College of Agricultural and Environmental Sciences who have completed at least 12 units of letter-graded courses on the Davis campus during any quarter and who have a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of students registered in the same class and college during the preceding quarter.

Honors at Graduation

Graduating students who are completing their majors with distinction may be recommended for honors, high honors, or highest honors. Recipients will have this distinction noted on their records and diplomas.

Honors at graduation will be awarded according to the conditions specified in the Academic Information section of this catalog.

College Medal

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.

Scholarships

To encourage capable young men and women to pursue careers in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students in this college. You are encouraged to apply for these scholarships if you have a high scholastic standing and demonstrate exceptional performance. Certain scholarships also require proof of financial need. Information is available from the Scholarship Office, or from the College Office, 228 Mrak Hall. (See also Scholarships.)
Engineering is the profession in which the physical, biological, and social sciences are applied in a practical way for the benefit of humankind. As an engineering student, you will learn to observe and describe problems related to technology and human needs and to seek useful solutions to these problems. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing, and other fields.

Fifteen undergraduate engineering curricula, including four formal double-major programs, are offered at Davis. These are all four-year programs that lead to the degree of Bachelor of Science in Engineering. Within each curriculum, you may choose an area of specialization by selecting suitable technical elective courses.

The following engineering curricula are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology: Aeronautical Science and Engineering, Agricultural Engineering, Chemical Engineering, Civil Engineering, Computer Science and Engineering, Electrical Engineering, and Mechanical Engineering.

The four-year undergraduate program is divided into two parts. The first part (the Lower Division Program) is made up of mathematics, physics, chemistry, humanities and social sciences courses, and certain introductory engineering courses. There are four Lower Division Programs in Engineering. The second part of the curriculum, the Upper Division Program, is made up of elective courses and a group of required technical courses pertinent to your major. Most of your senior year is elective, to be divided between technical and non-technical courses. Since practical engineering experience gained during your undergraduate years is also useful, you are encouraged to participate in engineering internship programs.

It takes more than four years of schooling to learn all you need to know about any profession. The objective of the undergraduate programs in engineering, therefore, is to form an appropriate foundation for your lifetime of learning. Extended learning after graduation—on-the-job experience, individual study, extension courses, or formal graduate study—is an essential part of an engineering education.

For information on graduate programs leading to the Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy degrees, or on Graduate Certificate Programs, refer to Graduate Study in Engineering at the end of this section.

ADMISSION TO THE COLLEGE OF ENGINEERING

Admission to Freshman Standing

There are no special requirements for admission to the College of Engineering other than the general University requirements. It is recommended, however, that you take the following subjects (or integrated courses covering substantially equivalent material) during high school:

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane geometry</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>1/2</td>
</tr>
<tr>
<td>Analytic geometry</td>
<td>1/2</td>
</tr>
<tr>
<td>Chemistry and/or physics</td>
<td>1</td>
</tr>
</tbody>
</table>
These subjects are prerequisite to certain basic courses in the freshman engineering program. You will be required to make up equivalent work if you are admitted without this preparation. As a result, your graduation could be delayed.

You must select a major before admission, and you may be limited in your freedom to change majors within the College once you have been admitted.

**Advanced Placement Examination**

Credit toward the total unit requirement for the degree is awarded for CEEB Advanced Placement Examinations satisfactorily passed, as indicated in the table shown in the Academic Information section of this catalog. As noted in the table, these units may be used to satisfy specific graduation requirements in the College of Engineering.

**Admission to Advanced Standing**

While it is possible for community college students to transfer to UC Davis after completing only the freshman year, the highest enrollment priority is given to applicants who have completed the entire lower division program. Once you have completed the lower division engineering curriculum at a California community college, your studies at Davis can be completed within two academic years. Questions about community college programs should be directed to your school counselor, or you can contact the UC Davis College of Engineering Undergraduate Office directly. (For information on admission to the University in advanced undergraduate standing, refer to the Admission section of this catalog.)

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.

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.

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations, vector analysis)</td>
<td>18</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>
<td>26</td>
</tr>
<tr>
<td>Engineering (lower-division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Chemical Engineering majors may elect to take only 12 units of engineering in their Lower Division Program)</td>
<td>15</td>
</tr>
<tr>
<td>Written and oral expression (courses that are equivalent to English 1 and Rhetoric and Communication 1 or 3)</td>
<td>8</td>
</tr>
</tbody>
</table>

| Humanities-social sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study) | 9                     |

**Specified subjects** (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year; Agricultural Engineering—Forest Engineering option majors should take courses in biology, botany and statistics; Agricultural Engineering—Food Engineering option majors should take courses in Microbiology and Biology.)

**Total**

Once you have completed the Lower Division Program and completed 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 215.

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.

Engineering is closed to Limited Status, Special Status, and Second Baccalaureate applicants.

**TRANSFER FROM ANOTHER UCD COLLEGE**

You may only submit petitions for a transfer into the College of Engineering from another UCD college 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 8A (or their equivalents) on a letter grade basis, and 4) have the minimum UC GPA specified for the year in which you wish to transfer.

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. Refer to the section on Academic Information for details on filing petitions, and consult the Engineering Undergraduate Office for details on minimum GPAs for specific majors.

**ACADEMIC ADVISING**

In establishing the College of Engineering's undergraduate programs, we have made every effort to provide for maximum flexibility consistent with rigorous preparation for professional practice or graduate study. The key to developing a flexible program for each student is an effective system of advising.

As an undergraduate in the College of Engineering you are assigned to a faculty member for academic and career advising. Initial adviser assignments are made through the Engineering Undergraduate Office before your first term on campus. Engineering majors usually keep the same faculty adviser throughout the
undergraduate years, but you may change to a new adviser of your choice whenever you wish. However, you must keep the Undergraduate Office informed of your adviser selections.

You are expected to meet individually with your faculty adviser at least once each quarter. New freshmen are required to meet with their advisers each quarter of the first year of enrollment, and new advanced standing transfer students are required to do so for the first quarter. To facilitate dialogue with your adviser on your program of study, we provide Advising Worksheets. (Extra copies are available in the Engineering Undergraduate Office.) You should work out your lower division worksheet early in your freshman year, get it signed by your adviser, and then review it regularly with your adviser. Similarly, you should work out your upper division worksheet early in your junior year, get it signed by your adviser, and then review it regularly with your adviser. Faculty advising is complemented by a peer advising system.

**MAJORS**

Majors (curricula) in the College of Engineering are Aeronautical Science and Engineering
- Agricultural Engineering
  - Aquaculture and Fisheries Engineering option
  - Food Engineering option
  - Forest Engineering option
- Chemical Engineering
- Civil Engineering
- Computer Science and Engineering
- Electrical Engineering
- Materials Science and Engineering (MS&E)
  - Chemical Engineering/(MS&E)
  - Civil Engineering/(MS&E)
  - Electrical Engineering/(MS&E)
  - Mechanical Engineering/(MS&E)
- Mechanical Engineering

Although you are required to select a major before your admission, after your first year you are encouraged to make use of the advising and counseling available to students if you are uncertain about persisting in your choice of a major. Because of overenrollment, certain restrictions have been placed on changes of major within the College, but information and advice are available from faculty and student advisers and the associate dean for undergraduate studies. The Internship and Career Center, the Advising Services Office, the Counseling Center, and other sources listed in the index under Advising are also good places to seek assistance.

**MINORS**

The College of Engineering does not offer minors in engineering fields; however, engineering students may choose to complete one minor offered by either the College of Agricultural and Environmental Sciences or the College of Letters and Science. (See the minor program list in the specific college section.) A minor normally consists of at least 18 units of upper division course work.

You must plan a minor program carefully with the appropriate adviser(s) within the college offering the minor of your choice. Minor declaration forms are available in the appropriate college dean's office. The filing period for declaring a minor coincides with that for filing for degree certification (see Calendar).

Minors are not required and may not be the basis for petitions to substitute classes for approved Humanities-Social Sciences (HSS) electives.

**PLANNING YOUR PROGRAM**

A number of freshman engineering courses are designed to describe the engineer's role in society and to show the similarities and differences among various engineering branches. Included are
- Engineering 3 (Introduction to Engineering Systems)
- Agricultural Engineering 1 (Introduction to Agricultural Engineering)
- Chemical Engineering 1 (The Scope of Chemical Engineering)
- Civil Engineering 1 (The Civil Engineer in Society)
- Electrical and Computer Science Engineering 1 (Introduction to Electrical and Computer Engineering)
- Mechanical Engineering 1 (Mechanical Engineering)

You may wish to take one of these courses to assist you in your decisions about your program. You are held responsible for planning your program. But that does not mean you are simply on your own. Your faculty adviser, with whom you are strongly urged to consult prior to registration each quarter, is the primary source of assistance. The Undergraduate Office of the College is willing to assist, as are the many advising offices throughout the campus. The Advising Worksheet described under Academic Advising is especially helpful for planning.

Specific degree requirements for the various engineering curricula are listed under Engineering in the Programs and Courses section. The minimum number of required units varies with the curriculum and ranges from 180 to 215. Programs normally require a minimum of 12 to 14 quarters of study averaging 15 units each. A regular full-time student must satisfy the University's requirements for minimum progress.

Sample arrangements that list the Lower-Division and Upper-Division Programs in a quarter-by-quarter sequence may be found in the College of Engineering Bulletin, available from the Engineering Undergraduate Office.

**Program Flexibility**

You should complete all prerequisite courses during your first two years, but the remaining non-prerequisite natural science courses and Humanities-Social Sciences courses are requirements for graduation, and can be scheduled to suit your individual study program.

In planning your four-year program, be sure to observe course prerequisites in order to avoid a delay in graduation. Course prerequisites are specified to help you avoid courses for which you are unprepared
and to help the instructor establish a starting point for a given course. The prerequisites for any course may be waived by the course instructor, for good cause, for individual students.

Course Priorities for Freshmen
Course priorities for the first quarter of your freshman year are suggested below:

- Mathematics 11, Analytic Geometry (if not completed in high school)
- Mathematics 21A, Calculus (if not completed in high school)
- English A (if the Subject A requirement is not yet otherwise satisfied)
- Engineering 3 or 4; English 1 or 3, or Comparative Literature 1, 2, or 3; Chemistry 1A or 4A; Rhetoric and Communication 1 or 3; or Humanities-Social Sciences and General Education electives

If you have not satisfied the Subject A requirement before entering the University, you must do so as early as possible during your first year of residence. If you have not done so after three quarters of enrollment, you will not be eligible to enroll for a fourth quarter.

You may not receive General Education credit for courses taken before you have satisfied the Subject A requirement.

If you are in the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering major, or are considering the possibility of petitioning to transfer to this major, you should take Chemistry 4A-4B-4C in your freshman year.

Expanded Course Outlines
In planning your program, you may consult the file of expanded course outlines for all courses offered by the various engineering departments at the Undergraduate Office of the College.

Special Courses
Variable-Unit Courses: Refer to the Academic Information section of this catalog for unit limitations on special study, internship, and other variable-unit courses.

Internship Courses: Internship courses numbered 92 and 192 are designed to provide practical and applied experience. Further information is available from your adviser, the respective Engineering department offices, or the Internship and Career Center.

University Extension Courses: Appropriate courses taken through University Extension may be used for degree credit. Simultaneous enrollment in resident courses and Extension courses requires prior approval by the Associate Dean for Undergraduate Studies of the College. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

DEGREE REQUIREMENTS
YOU ARE RESPONSIBLE FOR PLANNING YOUR PROGRAM AND FOR SATISFACTORY COMPLETION OF DEGREE REQUIREMENTS.

University requirements and the campus General Education requirement for the bachelor's degree are explained in the Bachelor's Degree Requirements section of this catalog.

For the General Education requirement, all majors in the College of Engineering are in the Nature and Environment area. Therefore, courses used to satisfy the general education requirement must be chosen from the remaining two areas, Civilization and Culture and Contemporary Societies. The relationship of these courses to the Humanities-Social Sciences electives is discussed under Electives in this section.

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 64 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.

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.

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 upper division required courses in your major.
English Composition Requirement
After completing 84 quarter units, you must satisfy the upper division English Composition requirement in one of three ways:

1. 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.)

2. by completing English 103A with a grade of C or higher after completing 84 units of college work.

3. by successfully completing English 102 adjunct to Chemical Engineering 155A or 155B (Chemical Engineering and Chemical Engineering/Materials Science and Engineering majors only).

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 1990-91 academic year, the English Composition Examination will be offered on the following three Saturdays: October 27, February 2, and April 27. Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mirk Hall foyer, Monday through Thursday 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 program with your adviser in the course of completing the upper division advising worksheet.

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 change takes place. The Humanities-Social Sciences (HSS) electives are emphasized 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 areas. 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:

Afro-American Studies 10, 15, 80, 100, 101, 107, 110, 120, 121, 123, 133, 145A, 145B, 150A, 150B
Agricultural Economics 1, 100A, 100B, 120, 150, 169
American Studies 1A, 1B, 1E, 1F, 2, 10, 45, 101A, 120, 125, 130
Anthropology 2, 3, 4, 101, 110, 112, 114, 120 through 149, 170 through 179
Applied Behavioral Sciences 1, 2, 17, 18, 151 through 154, 157, 161 through 165, 170, 171, 172, 175 through 178, 190
Art 1A, 1B, 1C, 1D, 10H, 10S, 15, 20, 25, 150 through 188C, 190 (also Art 1AG, 1BG, 1CG, 1DG, and 25G when taken concurrently with Art 1A, 1B, 1C, 1D, and 25)
Asian American Studies 1, 2, 100, 101, 110, 111, 112, 130, 150, 155
Chicano Studies 10, 20, 102, 132
Chinese 10, 11, 104 through 107, 109A-I, 111 through 116, 130, 131, 132
Classics 4A, 10, 17A, 17B, 17C, 20, 140, 141, 142, 143, 174, 175
Comparative Literature 1 through 53B, 135 through 170
Consumer Science 100
Design 140, 142A, 142B, 143, 144
Dramatic Art 15 (but not 15L), 20, 70, 115, 150 through 159
East Asian Studies 113
Economics 1A-1B, 100, 101, 105, 106, 110A through 136B, 151A through 175
Education 110, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 153
English 3, 30A, 30B, 45, 46A, 46B, 46C, 105C, 107, 110A through 189
Environmental Studies 101, 133, 160 through 167, 169
French 25, 45, 101, 102, 103, 107, 112 through 123, 140 through 150, 162
Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 6, 10, 50, 104, 121, 122A through 127, 141 through 162, 170 through 173, 175
German 48, 50, 51, 52, 106, 110 through 133
History 1 through 90A, 101 through 191B, 193 through 196B
Human Development 15, 100A through 103, 110, 130, 131, 132, 151, 160
Integrated Studies 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)
International Agricultural Development 10, 103
Italian 25, 107 through 139C
Japanese 10, 25
Landscape Architecture 140
Linguistics 1, 100, 102, 113, 115, 120, 138, 150
Medieval Studies 20A, 20B, 20C, 120A-F
Native American Studies 1, 10, 32, 33, 55, 70, 101 through 161, 180, 181A, 181B, 181C, 188, 190, 191
Nutrition 20
Philosophy 1, 10A-G, 14, 18, 21, 22, 23, 24, 100 through 106, 109, 114A through 123, 137, 143 through 176, 190
Physical Education 36A, 36B
Political Science 1 through 7, 100 through 113, 115 through 190
Portuguese 103A-118
Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 168, 171, 177, 183
Religious Studies 1, 2, 4 through 75, 100 through 172
Rhetoric and Communication 10, 42, 103 through 143, 152
Russian 30, 41, 42, 120 through 154
Scandinavian 110, 111
Sociology 1, 2, 3, 25, 102, 107, 110 through 165B, 170 through 185
Spanish 34, 35, 100, 103A through 109, 111 through 129, 134, 135, 136, 138, 149, 150, 151
Textiles and Clothing 107
Women's Studies 50

General Education electives are used to satisfy a campus requirement and are chosen from the list in the Bachelor's Degree Requirements chapter of this catalog. 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) course work is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses (e.g., six courses for a student entering UCD as a freshman). 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 list of GE courses in the Bachelor's Degree Requirements chapter of this catalog. 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 course work at both the introductory and non-introductory 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 course work. 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 (192e) 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 (restricted to one unit of technical elective), 194H, 195, 197H, 198, 199
Chemistry 194H, 197, 198, 199
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 113, 140, 147, 148, 157, 176
Agricultural Engineering Technology 161A, 161B
Animal Science 1, 105, 133
Art 121A
Atmospheric Science 105, 121A, 121B, 124, 133, 149A
Biochemistry and Biophysics 101A, 101B
Biological Sciences 1A, 1B, 1C
Chemistry 1C, 4C, 5, 8A, 8B
Economics 11A, 11B
English 104
Environmental Biology and Management 110
Environmental Toxicology 131
Food Science and Technology 100A, 100B, 102, 104, 108, 111, 131, 150
Genetics 100
Geography 106, 110
College of Engineering

Geology 1, 1L, 17, 50, 50L, 60, 105, 116, 117A, 117B, 123, 124, 134, 150A
Microbiology 2, 102, 130A
Physiology 2, 110, 120B, 120E, 149
Resource Sciences 100, 131
Soil Science 100, 102, 107, 120
Textiles and Clothing 100
Vegetable Crops 101
Water Science 41, 103, 104, 122, 141, 142, 150, 154, 160, 172, 180
Wildlife and Fisheries Biology 120, 121

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 curriculum.

Physical and Biological Science electives. Transfer students who have not completed the Physical and Biological Science electives requirement should choose courses from the following list of areas:

- Atmospheric Science
- Biological Science
- Botany
- Chemistry
- Biochemistry
- Geology
- Microbiology
- Physics
- Physiology
- Zoology

Degree Requirement Statements

As engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. In order 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

You should 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). In order to have this degree check prepared, you must submit a signed Degree Check Request. You can obtain further information concerning this service and forms for requesting it in the Engineering Undergraduate Office.

GRADING

Passed/Not Passed Option

While registered in the College of Engineering, you may enroll in a maximum of one course per quarter in which you choose the Passed/Not Passed (P/NP) grading option. 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 college Humanities-Social Sciences electives and the English and rhetoric requirements, or (c) the technical electives requirement may be taken on a Passed/Not Passed 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

HONORS

The Dean's Honors List

The Dean's Honors List is posted quarterly in the glass case outside the College of Engineering Undergraduate Office. This list includes the names of all undergraduate engineering students who have completed at least 12 units during the preceding quarter (exclusive of courses taken on a Passed/Not Passed basis) and who have achieved 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 College at the same class level during that quarter. A notation is made on your transcript each time you qualify for the Dean's Honors List.

Honors at Graduation

Graduating students in the College of Engineering who have achieved distinguished scholarship while at the University may qualify for honors, high honors, or highest honors. The names of these students are given in the Commencement Program in June, and this distinction is noted on their records and diplomas. Honors at graduation will be awarded to students who have completed at least 45 units of work at the University with a grade-point average that places them in the appropriate top percent of the graduating class in the College of Engineering. (See Honors and Prizes in the Academic Information section.)

College Medal

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.

GRADUATE STUDY IN ENGINEERING

The following departments and divisions offer courses of study leading to both the Master of Science and Doctor of Philosophy degrees. Programs in these departments are particularly appropriate for those wishing to prepare for careers in teaching, research, or analytical design.

- Aeronautical Science and Engineering
- Agricultural Engineering
• Applied Science (Davis-Livermore)
• Chemical Engineering
• Civil Engineering
• Computer Science
• Electrical Engineering and Computer Science
• Materials Science and Engineering
• Mechanical Engineering

Professional programs emphasizing design and leading to the Master of Engineering and Doctor of Engineering degrees are offered by the following departments:
• Agricultural Engineering
• Civil Engineering
• Electrical Engineering and Computer Science (Doctor of Engineering degree only)
• Mechanical Engineering

Graduate students in engineering are permitted wide latitude in selecting courses and research or design subjects at both the master's and doctoral levels. A purposeful and well-integrated course of study is planned with the help of an adviser or guidance committee. A student is required to enroll in the departmental seminar each quarter while in residence.

More general information may be found in the Graduate Announcement, obtainable from the Dean of the Graduate Division. Detailed information on graduate study in engineering is contained in the College of Engineering Bulletin, available from the College, Office of Graduate Affairs.

Instructional Television Program

Many courses in engineering, predominantly graduate-level courses, are available on the campus television network at receiving sites in Livermore. Those interested in TV classes should contact the Instructional Television Program, 916-752-2950.

Graduate Certificate Program

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects, and requires fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

General requirements for the program are
• 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work
• Admission to the Graduate Division

Further information on the Graduate Certificate Program may be found in the College of Engineering Bulletin.
College of Letters and Science
The College of Letters and Science offers programs of study that expose a student to the worlds of human experience, of ideas, of artistic accomplishments, and of matter and things. These four worlds are the domains of the social sciences, the humanities, the fine arts, and the natural sciences, respectively. Although separate and distinct to the casual observer, these areas are interconnected and may be studied in a coherent curriculum. It is within this curriculum that you will be able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge primarily for its own sake, and gain the capacity for independent study and thought.

A well-balanced liberal education, including in-depth study of a major field, should prepare you for a satisfying life, whatever your career. And since more and more career opportunities depend on the completion of a basic letters and science curriculum, such an education will also have a vocational value.

The main emphasis in the College remains, however, on the ends of living rather than on the means. Undergraduate education in the College stresses breadth rather than specialization.

Within the specific standards of scholarship and unit distribution that the College has established for its programs of study, there are three groups of requirements crucial to the realization of the College’s educational goals: the English Composition Requirement, the Foreign Language and Area Requirements, and the Major Requirements.

The English Composition Requirement is designed to ensure that you are well versed in the skills of written communication.

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

The Major Requirements enable you to gain intellectual depth and competence in a selected area of study.

Bachelor of Arts (A.B.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees are offered by the College. The B.A.S. degree is for those who have two majors, one normally leading to an A.B. degree and the other to a B.S. These degrees are conferred upon your completion of the University’s requirements, the General Education requirement, and the College’s breadth and major requirements detailed in the Bachelor’s Degree Requirements section of this catalog.

Every student is personally responsible for seeing that these graduation requirements are met. (Changes in graduation requirements, other than those in the major, adopted after publication of the General Catalog, are posted on the Letters and Science bulletin board opposite 175 Mrak Hall.)

STUDENT SERVICES
Information:
Letters and Science Advising Office
150 Mrak Hall
752-0392

The primary function of the Letters and Science Advising Office is to assist students with questions concerning academic matters and program planning. The deans and academic counselors staff an advising service designed especially to assist undeclared students with selecting a study program and in their search for a major. All students are welcome, however, to come in for general academic advising.

This office can also help you with questions concerning College requirements, scholarship (probation and disqualification), and other academic matters. Teams of academic counselors, staff and peer advisers are available between 8:00 a.m. and 5:00 p.m., Monday through Friday to answer your questions, act on petitions, and provide knowledgeable advice. Counselors and deans are regularly available to students by appointment as well.

The Dean’s Office also performs a number of regular functions:
• 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 a Status Card outlining the way in which transfer credit satisfies College and University requirements
• Provides workshops and individual review to identify remaining College requirements (See Degree Check at the end of this section.)
• Acts on petitions requiring the Dean's approval, e.g., petitions for declaration or change of major;
change of study list after established deadlines; waiver of minimum progress requirements; permission to take 200-, 300-, and 400-numbered courses for degree credit; withdrawal; reentry on probation or after completion of 120 units

- Reviews the records of students who are subject to disqualification and decides whether such students may continue on academic probation or will be dismissed

ADVISING

Faculty Advising

Given the range of programs and courses offered within the College of Letters and Science, good advice is essential if students are to design an educational program that will best fit their needs and individual goals.

The relationship between student and faculty adviser is largely a voluntary bond. Thus, the effectiveness of advising depends both on the perceptiveness of the adviser and the initiative of the student.

An adviser can assist you not only in meeting minimal degree requirements, but also in taking maximum advantage of the resources available in the University. Your transcripts from other colleges (your own copy is necessary) should be made available to your adviser. You are encouraged to talk to faculty advisers in different fields to enable you to make educational decisions on the basis of the broadest possible body of information and ideas. Although degree requirements may appear many and complex, they leave substantial room for individualization of study programs. With the help of faculty advisers, you can explore many areas—some in depth—while still progressing toward your major degree objectives.

Remember, it is your responsibility to maintain regular contact with your faculty adviser. A good relationship is developed by meeting frequently and discussing honestly and thoughtfully your evolving interests, your academic and experiential background and your goals. A conference at least once a quarter is especially desirable for new students during their first year in the College and for seniors during the final quarters preceding graduation.

Feel free to come to the Letters and Science Advising Office for consultation on any academic matter.

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 the graduation requirements. You must also have declared a major by this time (see The Major section below).
- Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.
- Before you complete 135 units of degree credit, including transfer work, you must obtain a Degree Check (see the end of this section) 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 (see the end of this section) in order to achieve your goals and to meet the degree requirements, you must contact the Letters and Science Advising Office immediately.

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

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 for admission, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

If your faculty adviser is unavailable at a critical time, you should ask the department or program administering your major for an alternate adviser to assist you temporarily. Department and program offices are listed in the Class Schedule and Room Directory.

If you did not indicate an initial commitment to a particular major program on your application for admission, you will participate in the Academic Options Program which is designed to provide academic advising to lower division students. You will be advised by a team of advisers: several faculty members representing the four Letters and Science major areas, an academic counselor and a peer adviser. This advising team will be available in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Through one-on-one advising and group workshops and programs, this team will work with you to guide your academic planning to ensure progress toward your educational goals and satisfaction of your degree requirements. They will assist you in exploring your options before you select your major.

Students are assigned to the Academic Options Program advising team located in their university residence hall complex. Students living off campus are asked to contact the Letters and Science Advising Office, 150 Mrak Hall, early in the quarter to receive their adviser assignments.

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.

If you participate in the Summer Advising and Registration Conference, you will be assisted in planning your Fall Quarter program by a temporarily assigned summer faculty adviser. During Orientation Week of
the fall quarter, you should contact the regular faculty adviser you have been assigned.

Continuing students who have completed three quarters in residence in the College are no longer obligated to consult an adviser except at checkpoint stages (above); they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which may delay graduation.

Seniors should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

Peer Advising

Student-to-student advising is an important part of the University advising services. Peer advisers are integral members of the staff advising teams in the Letters and Science Advising Office, 150 Mrak Hall, and are always available to talk with students about their academic concerns. Refer to the index under “Advising” for information on the various peer advising programs throughout the campus.

Letters and Science Advising Office

Information:
150 Mrak Hall
916-752-0992

Deans and academic counselors are available by appointment and other advising personnel are ready to answer questions on a drop-in basis at the Letters and Science Advising Office. Students who are as yet uncertain of their goals, and especially students lacking a clearly identifiable interest, are urged to make an appointment with one of the counselors. Peer advisers, as members of the staff advising teams in the Letters and Science Advising Office, are prepared to answer most questions about College requirements. Student-to-student advising is an important part of the University advising services. Preprofessional advising is also available to Letters and Science students, even though the College does not offer special preprofessional programs. Students who plan to prepare for a professional school undertake a normal program leading to a bachelor’s degree. Some courses required by a professional school are included in the requirements for the bachelor's degree, and additional courses you need may be taken as electives. You should become aware of the requirements for prospective professional schools early in your career in order to plan a suitable program. You may obtain further assistance from the Health Sciences, Pre-Law, and Pre-Business Advising Offices, or the Internship and Career Center.

TEACHING CREDENTIAL

The teacher education program is administered by the Graduate Division. See The Graduate Division section, Teacher Credential Programs, for more complete information.

THE MAJOR

There are three types of programs which satisfy requirements for the major: departmental majors, interdepartmental majors, and individual majors.

Major Programs Offered by the College of Letters and Science

Following is a list of the departmental and interdepartmental major programs offered by the College of Letters and Science. All but five of the majors offer a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree as well are indicated by a footnote symbol (see below). Each Letters and Science major comes under one of the three General Education categories: Culture and Civilization (CC), Contemporary Societies (CS), and Nature and the Environment (NE). The appropriate category is indicated immediately following the major.

Afro-American Studies (CS)
American Studies (CC)
Anthropology (A.B. degree—CS; B.S. degree—NE)
Applied Physics (NE)
Art History (CC)
Art Studio (CC)
Biochemistry (NE)
Biological Sciences (NE)
Botany (NE)
Chemistry (NE)
Chicano (Mexican-American) Studies (emphasis on Humanities—CC; emphasis Sociology—CS)
Classical Civilization (CC)
Comparative Literature (CC)
Computer Science (NE)
Dramatic Art (CC)
East Asian Studies (CC)
Economics (CS)
English (CC)
French (CC)
Genetics (NE)
Geography (A.B. degree, emphases I, II, III, V—CS, emphasis IV—NE; B.S. degree—NE)
Courses listed in this catalog under Asian American Studies, Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Portuguese, Scandinavian, and Swedish are taught by teaching departments or programs in the College of Letters and Science, but no undergraduate majors in these areas now exist.

Declarations of Major

After an initial period of academic exploration, students are expected to focus their interests and declare a major by the time they have completed 30 units. If you have not declared a major by this point, a hold will be placed on your registration materials. The hold will be removed only when your Petition for Declaration or Change of Major is on file in the Dean’s Office. Petitions can be obtained from faculty advisers or the offices administering the respective major programs. Office locations are published in this catalog and the Class Schedule and Room Directory each quarter. As a part of the petitioning procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the Dean have approved the petition. The department or curriculum committee supervising the major program will assign you to a faculty adviser.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper division courses you have taken toward the major. Additional requirements, such as completion of a particular set of required courses with a specified grade-point average (usually well above a C average) may be introduced as conditions for acceptance into any major at any time.

Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. If you choose this option you will work closely with faculty advisers who have expertise in the requisite fields of interest to develop a coherent and rigorous academic program. This program of courses is then submitted to a faculty committee for review and approval. If you wish to undertake an individual major, request the appropriate forms, which include detailed instructions, from the Dean’s Office, 150 Mrak Hall. Program requirements are outlined under Individual Major in the Programs and Courses section of this catalog.

Multiple Majors

If you are interested in two or more areas of study, you may choose to satisfy the requirements of more than one major. Multiple majors offer the advantage of a systematic, in-depth approach to two or more disciplines. However, flexibility in planning your courses and exploring new areas of knowledge are restricted by the obligation to satisfy the requirements of more than one major. Students choosing to satisfy multiple major requirements notify the Dean’s Office of their decision by submitting 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.

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

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 Major

You may simultaneously pursue major programs in two undergraduate colleges on the Davis campus. The same conditions and criteria apply 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.

Change of Major Within the College

You may change from one major to another within the College. Consent of the department or committee in charge of your proposed new major is required. Admission into a major program may be denied by the program or by the Dean if your grade-point average in courses required for the selected major is less than 2.00.

Procedures for change of major within the College are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). It is not possible to change or declare a major in the quarter of graduation.

Change of Major Accompanied by Change of College

In order to change from one college to another, you must be in good standing (not on probation or subject to disqualification).

If you are in good academic standing and want to transfer into the College of Letters and Science, you must petition to do so within the first five weeks of any quarter. Petitions, which are available at the Office of the Registrar and the Dean’s Office, must be endorsed by your new faculty adviser and signed by your former College Dean before being submitted to the Letters and Science Dean for consideration and approval.

A 2.000 grade-point average in the courses required for the new major is usually necessary at the time of transfer. Requests for changes of major from students in senior standing may be approved only under unusual circumstances, but in no case during the quarter of graduation.

Grade-Point Averages in the Major

In addition to the general University requirement of a C average (2.00) for all University work, the College stipulates the following additional grade-point criteria for graduation:

You must have an average of at least 2.000 for all UCD courses required for the major; you must also have at least a 2.000 average for all upper division courses required for the major.

A department or curriculum committee may refuse to accept you into a major they administer if you do not have at least a 2.000 average in the courses required for the major.

If your performance is unsatisfactory after you have declared a major program, you may be required to withdraw from that major by the Dean, upon written recommendation from the chairperson of the department or the curriculum committee that administers the major.

THE MINOR

If you are interested in two or more areas of study, you should consider the possibility of pursuing your goals by completing one or more of the optional minors offered by the College. Many teaching departments and programs offer optional minors and some also sponsor interdisciplinary minor programs. Completion of a minor is not required for graduation, but you may elect to satisfy requirements and have completion of the minor(s) certified on your transcript. Certification of a minor on the transcript indicates that you have completed a coherent program of courses in an area of interest outside your major. The minor may complement your major, but it is not particularly meaningful unless the field of study is significantly different from that of your major. Most teaching departments and programs that offer or sponsor a minor program list course requirements in the Programs and Courses section of this catalog. Following is a list of those minors:

- Afro-American Studies
- American Studies
- Anthropology
- Art History
- Art Studio
- Asian American Studies
- Biological Sciences
- Botany
- Chicano (Mexican-American) Studies
- Chinese
- Comparative Literature
- Dramatic Art
- East Asian Studies
- Education
- English
- French
- Geography
- Geology
- German
- Greek
- History
- Italian
- Japanese
- Latin
- Linguistics
- Mathematics
- Medieval Studies
- Music
- Native American Studies
- Philosophy
- Physical Education
- Physics
- Political Science
- Portuguese
- Psychology
- Religious Studies
Rhetoric and Communication
Russian
Sociology
Spanish
Statistics
War-Peace Studies
Women's Studies

Some departments and programs in the college do not offer a minor, while others may offer several. You can elect only one minor in a subject area. If the department or program you are interested in does not list a minor in this catalog, check with that department or program office. Letters and Science students may elect minor programs approved by the College of Agricultural and Environmental Sciences.

A minor consists of 18 to 24 units in upper division courses specified by the department or program. 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 2.000 in all courses required for the minor. At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, 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 the College Dean's Office and file it no later than the second week of the quarter in which you are graduating. Requirements for the minor must be met by the time of graduation. For specific deadlines, see the Academic Calendar at the front of this catalog.

DEGREE REQUIREMENTS

Each student is responsible for fulfilling all requirements for graduation. The University and General Education requirements can be found in the Bachelor's Degree Requirements section of this catalog. College requirements are listed below, including any restrictions in addition to the aforementioned requirements.

Unit Requirements

A minimum of 180 units is required for the bachelor's degree (see Unit Credit Limitations below). 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. All upper division General Education courses will be accepted in satisfaction of this requirement. Nonstandard courses (see Area Requirement in this section) do not count toward these 12 units.

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:

Professional courses (300 and 400 series, except numbers 399 and 499): 9 units maximum.
Extension courses: 9 units maximum by petition.
Graduate courses: 9 units maximum by petition.
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 separate unit limits on internship,
special study, and tutoring courses; and major limitations.)

Passed/Not Passed Courses: Maximum of one-fourth of UCD units graded P taken at student's option. (See also the Academic Information section.)

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.)

Limitation on Credit for Units Graded P. Excluding courses which 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.

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. For University requirements, see the Bachelor's Degree Requirements section in this catalog. (Work completed while enrolled in the Education Abroad Program does not satisfy campus or College Residence requirements.)

Scholarship Requirement

The minimum grade-point average is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. To obtain these minimal averages in the major, you may, with approval from your adviser, repeat courses that are graded D or F. If you have to repeat a course more than once, you need the Dean's approval. Only grades earned in courses taken at UCD will be included in the grade-point computations.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see College Policies and Procedures) 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).

Foreign Language Requirement

A.B. and B.A.S. degrees—the 15-unit level or the equivalent in one language. (For detailed information, see Foreign Language Requirement in this section.)

B.S. degree—none.

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;

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 credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirements.

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.

B.S. degree—a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement (see Bachelor's Degree Requirements section).

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 work-learn 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.

Area Requirement List (B.S. degree)

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 requirements. 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.
Biochemistry and Biophysics.
Biological Sciences, All courses except 19.
Botany.
Chemistry.
Engineering 20.
Engineering: Civil 30.
Engineering: Computer Science 10, 30, 32, 40, 100, 110, 120, 122, 140, 170.
Engineering: Electrical and Computer Science 171.
Entomology 10, 100.
Environmental Studies 30.
Food Science and Technology 2.
Genetics.
Geology.
Human Anatomy 101.
Integrated Studies 1A, 1B, 8A.
Mathematics.
Microbiology.
Nutrition 10.
Physical Education 101, 102, 103, 110, 111, 112, 113, 115.
Physics.
Physiology.
Resource Sciences 2, 131.
Statistics.
Textiles and Clothing 110.
Wildlife and Fisheries Biology 10.
Zoology.

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

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.

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. The Foreign Language Requirement should be completed 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 (junior year abroad).

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 prior to admission to the College.

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.

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.

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 enrolled 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 these matters are handled, check with the department or major program office if you have any questions about which requirements are applicable to you.

**COLLEGE POLICIES AND PROCEDURES**

Inquiries concerning the policies and procedures listed in this section should be directed to the Dean's Office, College of Letters and Science, 150 Mrak Hall.

**CREDIT FOR COURSES**

**Advanced Placement Examinations.** For credit allowed and course equivalencies on units earned through Advanced Placement Examinations, see the College Board chart in the Academic Information section.

**Education Abroad Program.** Full University credit may be awarded for courses taken through the Education Abroad Program. See the Introduction section in this catalog for eligibility requirements and application deadlines.

**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 prior to enrollment. 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 Senior Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

**Graduate and Professional Courses.**

**Enrollment**—Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series under the following conditions.

- Graduate courses in the 200 series are ordinarily open only to students who have completed at least 18 units of upper division work basic to the subject matter of the course.

- Admission to graduate and professional courses must be approved by the instructor in charge of the course.

Graduate and professional courses which 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.

**Degree Credit**—Within the limitations A, B, and C given below, an undergraduate student in the College may count up to 9 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.

Internship Courses. Student internships (generally courses numbered 92 and 192) are available through many Letters and Science departments. You must have completed a minimum of 84 units before credit will be allowed for an upper division internship course. Internships offer students the opportunity to apply classroom learning, to experience various work situations, and to test their career objectives. The Internship and Career Center has information on internships available or can help you develop one.

Repeated Courses. You may repeat a course in which you received a D, F, or NP. If the course you would like to repeat is part of a sequence (e.g., Mathematics 16A, 16B, 16C) and you have already passed a subsequent course in the sequence (e.g., you want to repeat Mathematics 16A, but you have already passed Mathematics 16C), you should check with the Dean's Office and the department regarding whether you can receive grade-point and/or unit credit. See also the section on Academic Information. See also, the section on Repetition of Courses in the Academic Information section of this catalog, especially regarding computing the grade-point average for the first 16 units of repeated courses and thereafter.

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 Davis.

ENGLISH COMPOSITION EXAMINATION

The English Composition requirement can be met with a passing score in the English Composition Examination. No fee is charged and no unit credit is given for the examination.

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

October 27, 1990
February 2, 1991
April 27, 1991

If you take this examination, you must do so after having completed 70 units. 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, Monday through Thursday (or until filled) just preceding each Saturday examination date.

The English Composition Examination form, available at the UCD Bookstore, is required.

PASSED/NOT PASSED GRADING

Filing Procedures

Passed/Not Passed petitions are available for students in good academic standing in the Dean's Office, 150 Mrak Hall, on the dates listed in the Class Schedule and Room Directory, and must be filed in person.

No signature other than yours is required on the petition. For detailed information, see the Academic Information section in this catalog.

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.

REGISTRATION BEYOND THE 225-UNIT LIMIT

A minimum of 180 units is required for the bachelor's degree, and you are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed, you may register only with the permission of the Dean. Permission may be granted for sound educational reasons and for a limited time. 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 enrollment 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.

DEGREE CHECK

Before the beginning of your senior year, you should take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and 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, an informational packet is available in the Letters and Science Advising Office providing detailed instructions on evaluating your progress on College and University requirements along with special workshops for seniors. You should also obtain a check of major requirements from your faculty adviser.

Once 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.

UNIT LIMITATIONS

Ordinarily, a full-time student takes 12 to 15 units a quarter. (Note the Minimum Progress requirements in the Academic Information section.) In order to graduate in four years you need to complete 15 units a quarter.
Students in their freshman 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 make-up work to remove incomplete grades is not included.

HONORS

The Dean’s Honors List

The Dean’s Honors List recognizes the academic achievements of students who have

1. completed at least 12 units for a letter grade during that quarter;
2. earned a grade-point average, for that quarter, that places them in the upper 16 percent of the students registered in their class level.

To remain on the Honors List you must meet these same standards every quarter. This list is posted quarterly on the College bulletin board in the foyer of Mrak Hall.

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.

Entrance into the honors program requires that a student have completed at least 35 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 advisor. 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. Successful completion of the honors program requires that a minimum of six units’ credit be earned in course work for the project.

Honors with the Bachelor’s Degree

Three categories of honors are awarded at graduation, honors, high honors, and highest honors. Graduation with honors requires that a student meet the appropriate grade-point requirement for all courses as described in the Academic Information section in this catalog. Students who complete the 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.

You will not be awarded honors with the bachelor’s degree if more than eight units of grade I (Incomplete) appear on your transcript. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Dean’s Office.

University and College Medals

Graduating seniors with a distinguished academic record in the College of Letters and Science 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 senior who not only has achieved academic excellence, but who also has interests outside of pure scholarship.

The college also nominates graduates with distinguished academic records for the University Medal.
The Graduate Division
The Graduate Division is the academic home of approximately 3,300 post-baccalaureate students who are seeking advanced degrees in more than 80 graduate programs on the Davis campus.

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 the Graduate Division. A University-wide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

Davis graduate programs are administered either by 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. Conforming well to UCD's progressive spirit, the group structure also allows for expansion of established degree programs and facilitates development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups.

ADVANCED DEGREE AND CERTIFICATE PROGRAMS AT DAVIS

The following advanced degrees are offered at UC Davis: Master of Business Administration, Master of Arts, Master of Science, Master of Fine Arts, Master of Arts in Teaching, Master of Engineering, Master of Education, Master of Agricultural Management, Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, and Doctor of Philosophy. Those departments or groups offering programs for the degree of Doctor of Philosophy may, if they choose to do so, recommend the degree Candidate in Philosophy for all students formally advanced to candidacy. In addition to these graduate degrees, professional degrees are offered in the Schools of Law, Management, Medicine, and Veterinary Medicine.

Majors for graduate study and the advanced degrees offered in each are shown below. General requirements for degrees are published in the Graduate Announcement. Specific requirements are available from the office or chairperson of the graduate program or group concerned.

**Majors and Degrees**

- Agricultural and Environmental Chemistry (M.S., Ph.D.)
- Agricultural Economics (M.S., Ph.D.)
- Agricultural Education (credential)
- Agronomy (M.S.)
- Animal Behavior (Ph.D.)
- Animal Science (M.S., M.A.M.)
- Anthropology (M.A., Ph.D.)
- Applied Mathematics (M.S., Ph.D.)
- Art (M.F.A.)
- Atmospheric Science (M.S., Ph.D.)
- Avian Sciences (M.S.)

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<tr>
<td>Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of the Graduate Division United States residents</td>
<td>June 1</td>
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<td>Aug. 1</td>
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<td>International students</td>
<td>April 1</td>
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<td>Deadline for filing applications for readmission to graduate status with the Graduate Division</td>
<td>Aug. 1</td>
<td>Nov. 1</td>
<td>Feb. 1</td>
<td>Aug. 1</td>
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<td>Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the Dean of the Graduate Division</td>
<td>Oct. 1</td>
<td>Jan. 11</td>
<td>Mar. 1</td>
<td>June 3 (for Sept.'91)</td>
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<td>Oct. 1 (for Dec.'91)</td>
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<td>Deadline for candidates for master's degrees to file theses with the committee in charge</td>
<td>Nov. 1</td>
<td>Feb. 8</td>
<td>May 6</td>
<td>July 22 (for Sept.'91)</td>
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<td>Deadline for candidates for master's degrees to file theses or final report on comprehensive examination with the Dean of the Graduate Division</td>
<td>Dec. 14</td>
<td>Mar. 22</td>
<td>June 14</td>
<td>Sept. 13 (for Sept.'91)</td>
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<td>Deadline for students who expect to complete work for the degree of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the Dean of the Graduate Division</td>
<td>Aug. 13</td>
<td>Nov. 12</td>
<td>Feb. 1</td>
<td>May 20 (for Sept.'91)</td>
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<td>Aug. 15 (for Dec.'91)</td>
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<tr>
<td>Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the committee in charge</td>
<td>Oct. 1</td>
<td>Jan. 7</td>
<td>Apr. 1</td>
<td>July 1 (for Sept.'91)</td>
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<tr>
<td>Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the Dean of the Graduate Division</td>
<td>Dec. 3</td>
<td>Mar. 1</td>
<td>June 3</td>
<td>Sept. 2 (for Sept.'91)</td>
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Graduate Group Programs

Programs sponsored by graduate groups with faculty drawn from more than one department are listed below. If you are interested in one of these areas of study, write to the group chairperson for more information. These programs are also entered alphabetically in the Programs and Courses section of this catalog, along with mailing addresses.

Agricultural and Environmental Chemistry
Agricultural Education
Animal Behavior
Applied Mathematics
Atmospheric Science
Avian Sciences
Biochemistry
Biomedical Engineering
Biophysics
Botany
Cell and Developmental Biology
Child Development
Community Development
Comparative Literature
Comparative Pathology
Computer Science
Earth Sciences and Resources
Ecology
Endocrinology
Engineering
Exercise Science
Food Science
Genetics
Horticulture
Human Development
Immunology
International Agricultural Development
Linguistics
Master of Education (M.Ed.)
Mathematics (M.A., M.A.T., Ph.D.)
Medicine (M.D.)—refer to School of Medicine
Microbiology (M.S., Ph.D.)
Music (M.A., M.A.T., Ph.D.)
Neurobiology (Ph.D.)
Nutrition (M.S., Ph.D.)
Pharmacology and Toxicology (M.S., Ph.D.)
Philosophy (M.A., Ph.D.)
Physical Education (M.A.)
Physics (M.S., Ph.D.)
Plant Biology (M.S., M.D.)
Plant Pathology (M.S., Ph.D.)
Plant Protection and Pest Management (M.S.)
Political Science (M.A., Ph.D.)
Preventive Veterinary Medicine (M.P.V.M.)—refer to School of Veterinary Medicine
Psychology (M.A., Ph.D.)
Rhetoric and Communication (M.A.)
Russian (M.A.)
Sociology (M.A., Ph.D.)
Soil Science (M.S., Ph.D.)
Spanish (M.A., Ph.D.)
Statistics (M.S., Ph.D.)
Textiles (M.S.)
Vegetable Crops (M.S.)
Veterinary Medicine (D.V.M.)—refer to School of Veterinary Medicine
Water Science (M.S.)
Zoology (M.A., Ph.D.)

APPLYING FOR ADMISSION

The University of California, Davis is committed to maintaining excellence, preserving fairness, and promoting diversity in its student population. Admissions criteria assess applicants’ probable future academic achievements and their potential for service in the field, keeping in mind the needs of our society and of minority and disadvantaged communities. Criteria also attempt to take into account any prior disadvantages applicants have experienced that may bear on future achievements and services.
Admission to a graduate program at the University of California requires a bachelor's degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by Universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist them 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.

Applications are accepted for fall quarter only. 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 major program is full, whichever occurs first.

Contact the Graduate Division for the Combined Application for Admission and Fellowship Form.

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 the Graduate Division. Supplemental application materials required by the major program must be sent directly to the graduate adviser for that program. When all application materials have been received by the Graduate Division, 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 the Graduate Division; final admission decisions rest with the Dean of the Graduate Division. This approval process 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 enrolled in a regular session as a graduate student and wish to return, you must apply for reentry and pay the Readmission Application Fee of $40 at least six weeks before the beginning of the quarter in which you plan to enroll (see the Academic Calendar at the front of this catalog). The application is obtained from the Graduate Division 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, CN6151, 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 Student Life section for complete details). Prior to registration, you will be required to sign either the Statement of Responsibilities for a Privately Funded Student or the Statement of Responsibilities for a Sponsored Student to show that you are able to undertake this level of expense for your education at UC Davis. No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of enrollment at UC Davis.

GENERAL REQUIREMENTS FOR ADVANCED DEGREES

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 the Graduate Division, 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 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 which must be completed prior to your admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the Dean of the Graduate Division. 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 are advanced to Candidacy for the degree. At this time, a committee is appointed to direct you in your research problem and guide you in the preparation of the dissertation.

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 some degree on the student's undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Graduate Announcement. 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.

INTERCAMPUS EXCHANGE PROGRAM

As a graduate student registered on any campus of the University, you may become an Intercampus Exchange Student with the approval of your graduate adviser, the chairperson of the department or group in which you wish to study on the host campus, and the Dean of the Graduate Division on both the home and the host campuses.

Although as an Intercampus Exchange Student you have library, health service, and other student privileges on the host campus, you are considered a graduate student in residence on your home campus. The grades obtained in courses on the host campus are transferred to your home campus and entered on your official record.

Application forms may be obtained at the Office of the Dean of the Graduate Division and should be submitted six weeks prior to the beginning of the quarter in which you wish to participate in the program.

PART-TIME ENROLLMENT

Some advanced degree programs are available to qualified graduate students who for reasons of occupation, family responsibility, or health are unable to attend full time. Students with part-time status must meet the same standards of quality for admission and for continuation in a graduate program as other students. Applicants desiring part-time enrollment in an approved program should file a petition with the Graduate Division after admission has been granted. Continuing graduate students who wish to change status between full-time and part-time must file a petition with the Graduate Division. To be considered eligible, graduate students must be enrolled for six units or fewer per quarter. Fee reductions that apply to part-time students are found under Fees and Expenses in
this catalog. Application forms are obtained at the Graduate Division Office. See the Academic Calendar for filing deadlines.

EMPLOYEE-STUDENT STATUS
Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter whichever is greater. Employee students on the semester system may enroll for up to six units or two courses, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Sections 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.

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 who plan to enter in a fall quarter and 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. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall. 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 the Graduate Division.

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. These fellowships are for the full amount of the nonresident tuition. A minimum grade-point average of 3.25 is required for eligibility. Application forms for Nonresident Tuition Fellowships are available at the Graduate Division, and must be filed with that office by January 15 (new students) April 1 (continuing students). International students are not eligible for a fellowship unless they have completed at least 18 units of graded course work at UC Davis. 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 and work-study for graduate students.

TEACHER CREDENTIAL PROGRAM
The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the multiple-subject (elementary) teaching credential program, with either a regular or a bilingual emphasis (Spanish), does not require any specific campus major. If you are accepted to this program, you can meet the state requirements for a diversified major by completing a regular University major and one of the following two alternatives:

- the additional requirements for the approved UC Davis Diversified Waiver Program (must be completed by August 31, 1994); OR
- achieving a passing score on the National Teachers Examination (General Knowledge section only).

California state single-subject (secondary) teaching areas for which Davis students can qualify are: agriculture, English (including drama and speech), foreign languages, government, history, home economics, life science, mathematics, music, physical education, physical science, and social science. For information concerning University majors and campus waiver programs which satisfy requirements for these state single subjects, or state-approved examinations available to test competence in subject areas, consult the appropriate adviser in the Division of Education or the Department of Applied Behavioral Sciences.

While admission to the teacher education program is by the Graduate Division, applications and filing deadlines should be obtained from the Division of Education, 174 Kerr Hall, or the Department of Applied Behavioral Sciences (home economics and agricultural education), 106 AOB 4. A scholarship record of B (3.0) is required for admission to the program.

- The California Basic Educational Skills Test (CBEST) must be taken prior to acceptance by the Graduate Division.

The teacher education program is available to upper division students also. With careful planning, it is possible for students to finish the requirements for a nonrenewable preliminary credential at the same time the bachelor's degree is completed. This credential allows recipients to teach for five years, but within that time an additional "fifth" year of study must be completed for the professional clear credential. Specific requirements may be obtained from the Division of Education.

Students considering teaching as a career should consult the Division of Education or the Department of Applied Behavioral Sciences as early as their freshman year. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.
Professional School Preparation
REQUIREMENTS AND PREPARATION

Eligibility for admission to one of the University of California professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years, depending upon requirements for specific schools. Announcements and information describing admission and course requirements for a particular school are available by writing to the school of your choice in care of the appropriate University campus.

Legend and addresses:

(B) University of California, Berkeley 94720
(D) University of California, Davis 95616
(I) University of California, Irvine 92717
(LA) University of California, Los Angeles 90024
(R) University of California, Riverside 92502
(SD) University of California, San Diego, La Jolla 92093
(SF) University of California, San Francisco 94143
(SB) University of California, Santa Barbara 93106
(SC) University of California, Santa Cruz 95064

Direct inquiries about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:

School of Business Administration (B)
School of Criminology (B)
Curriculum in Cybernetics (SF)
Curriculum in Dental Hygiene (SF)
Schools of Dentistry (LA, SF)
Curricula in Education (B, D, I, LA, R, SB, SC)
School of Engineering (I)
School of Engineering and Applied Science (LA)
School of Forestry and Conservation (B)
School of Journalism (B)
Curriculum in Medical Illustration (SF)
Curriculum in Medical Technology (SF)
Schools of Medicine (D, I, LA, SD, SF)
Schools of Nursing (LA, SF)
School of Optometry (B)
School of Pharmacy (SF)
Curriculum in Physical Therapy (SF)
Schools of Public Health (LA, B)
School of Veterinary Medicine (D)

Professional schools requiring a bachelor's degree in appropriate field of study for admission:

School of Architecture and Urban Planning (LA)
Graduate School of Business Administration (B)
Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for teaching credentials is available as follows:
Elementary Teaching (B, D, I, LA, R, SB, SC, SD)
Bilingual (Spanish) Emphasis—Elementary (D, I, LA, R, SB, SC, SD)
Secondary Teaching (B, D, I, LA, R, SB, SC)
Bilingual (Spanish) Emphasis—Secondary (I)
Special Education (B, I, LA, R, SB)

Pupil Personnel Services: Basic (Counseling) (B, I, LA, R, SB)
Agricultural Specialist Teaching (D)
Bilingual (Spanish) Specialist (D, SB)
Reading Specialist (B, LA, R, SB)
School Librarianship (B, LA)
School Psychology (B, D, LA, SB)
Clinical-Rehabilitative Services (SB)
Administrative (B, I, LA, R, SB)
Early Childhood Specialist (I)
Administration (B, LA)
Graduate School of Journalism (B)
Graduate School of Management (D, I, LA, R)
Schools of Law (B, D, LA)
Hastings College of the Law (SF)
School of Librarianship (B)
School of Library and Information Science (LA)
Graduate School of Public Policy (B)
Schools of Public Health (LA, B)
Schools of Social Welfare (B, LA)
Scripps Institution of Oceanography (SD)

PREPROFESSIONAL TRAINING

Preprofessional programs do not—in and of themselves—lead to a bachelor's degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers and are expected to pursue a major program while completing their preprofessional requirements.

With careful planning it is possible for students to undertake any one of a variety of majors. While most students interested in the health sciences will elect a major within the biological sciences, majors as varied as psychology, engineering, and art can be equally acceptable. Law and business schools do not prescribe any specific major program. They give equal consideration to all qualified applicants completing a course of study which gives them a broad cultural background and includes intensive work for a substantial period of time in a selected field of study.

REFERRAL INFORMATION

Although the Davis campus offers course work in preparation for admission to most of the schools listed above, the referral information which follows relates to the types of preprofessional training in greatest demand at Davis.

Students are strongly urged to read this catalog and the appropriate professional school announcement carefully before consulting faculty and staff about admission requirements. Communicate directly with personnel at the professional school to which you expect to apply if you need more detailed information. A list of general reference books which may be of interest is presented at the conclusion of this section.

MANAGEMENT

The UC Davis Graduate School of Management, which enrolls its tenth class in the fall of 1990, offers a two-year program of study in management and policy analysis leading to the Master of Business Administration degree. (See the School of Management section for details.)
BUSINESS ADMINISTRATION AND PUBLIC POLICY

Preparation for study: See published announcements of schools of business administration and public policy. For advice and counsel, see the departmental advisers in the Department of Economics (379 Kerr Hall, 916-752-0742) or Agricultural Economics (125 TB 8, 916-752-6185); or see the Pre-Business School (Peer) Adviser located in 359 Kerr Hall, 916-752-6512.

TEACHING CREDENTIALS

Preparation for Study: Those interested in preparing to be a teacher should know that the majority of students complete a teaching credential as part of a graduate program. However, there is significant work that may be done as an undergraduate, including prerequisites or other courses related to schools and children. This not only better prepares students for the credential year, it relieves the stress of an already crowded graduate professional year.

Advising: It is highly recommended that students consult the appropriate advising office as early as possible, particularly in specialized credentials such as bilingual education. All credential advising except Agriculture is done in the Student Advising Office of the Division of Education, 174 Kerr Hall (916-752-0757). Students interested in teaching Agriculture should go to the Department of Applied Behavioral Sciences in AOB 4 (916-752-1808).

Application: Students normally apply for the graduate credential program early in their senior year. See the Teacher Credential Program in the Graduate Division section of this catalog for additional information about acceptance into a credential program.

Financial Assistance: Financial support is available through such programs as APLE. Students from underrepresented groups are especially urged to apply.

FORESTRY

Preparation for Study: Consult this catalog and the announcement of the Department of Forestry and Resource Management, UC Berkeley.

Preforestry adviser: John W. Menke (Agronomy and Range Science), 249 Hunt Hall, 916-752-0568 or 752-1703.

LAW

Preparation for study: Consult this catalog, school announcements, and The Official Guide to U.S. Law Schools, prepared and published by the Law School Admission Council/Law Services.

Advising: Students interested in law school preparation should consult the Pre-Law Adviser, Pre-Law Advising Office, 108 South Hall, 916-752-3009. Information is available about law school admission procedures, academic program planning (see also under Advising Services), and professional possibilities.

School of Law, UC Davis: Consult this catalog, the catalog of the School of Law, or the Law School Admissions Office, 115 King Hall, 916-752-6477.

HEALTH SCIENCES

At the Davis campus only preparatory work is offered. Professional training for all fields except medicine, nurse practitioner, physician assistant, and veterinary medicine must be completed elsewhere. Degree work is offered at Davis for dietetics, but students must apply elsewhere for the required postgraduate internship. Information regarding careers in dietetics or nutrition can be obtained from the Nutrition Department or the Internship and Career Center on campus. Contact the Health Sciences Advising Office, (South Hall, 916-752-2872) regarding curricula and schools for all health science fields.

Suggested Curricula. Since specific school requirements vary, students should either contact the schools directly, or contact the Health Sciences Advising Office for more detailed information.

Students are advised that in California most professional programs are unable to accommodate all applicants. Students may wish to consider applying also to out-of-state programs. Professional school admissions committees evaluate applicants on the basis of their course work and grades, test scores, work experience, campus or community activities, and letters of recommendation.

Courses listed under each of the following health fields of study are general requirements only.

Clinical Laboratory Technology

To qualify for the required twelve-month medical technology traineeship in California, students need to complete a baccalaureate degree, which includes the following minimum course work requirements as specified by the State Department of Health.

Biological sciences: 27 units, including instruction in hematology (Clinical Pathology 101), immunology (Veterinary Microbiology 126 or Medical Microbiology 107), and medical microbiology (Veterinary Microbiology 127).

Chemistry: 24 units, including Chemistry 1A, 1B, 1C, 5 and Biochemistry 101A-101B or Physiological Sciences 101A-101B.

Physics 5A, 5B, 5C.

Mathematics: none required for California state license. Calculus (Mathematics 16A-16B) and statistics (Statistics 13) recommended.

Strongly recommended courses include: hematology (Clinical Pathology 101L); immunology (Veterinary Microbiology 126L); parasitology (Veterinary Microbiology 132, Medical Microbiology 215, or Entomology 156-156L); and a laboratory in clinical chemistry (e.g., Clinical Pathology 102 or Biochemistry 101L).

Recommended courses include: organic chemistry (Chemistry 8A-8B); Physiology 110-110L; virology (Veterinary Microbiology 128 or Microbiology 162); histology (Zoology 122).

Suggested electives:

Genetics (Genetics 100); Human Anatomy 101; advanced immunology (Veterinary Microbiology 270); computer programming (Engineering 5,
Computer Science Engineering 10, or 30; business management (Agricultural Economics 112).

Requirements vary among training programs. Students should check the individual program for additional required courses.

Dentistry

Students complete three to four years of preprofessional course work prior to admission to the three- or four-year dental curriculum. The Dental Admission Test should be taken in April or October—one year prior to the projected date of admission, but preferably in April. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory). Recommended: Biological Sciences 1A, 1B; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B; Microbiology 2-3.

Chemistry 1A-1B-1C, and at least 8 units of organic chemistry with laboratory (e.g., either courses 8A-8B, 128A-129A, or courses 128A-128B-128C and 129A-129B-129C). Check individual catalogs for specific requirements.

English: one year, preferably to include two composition courses (e.g., English 1, 3, 103). Comparative Literature courses are also acceptable.

Rhetoric courses are not acceptable.

Physics 5A, 5B, 5C.

Psychology: one lower- and one upper-division course. Recommended: Psychology 1, 16, 112, 145, or 168.

Suggested electives: Statistics 13 or Human Anatomy 101, 101L; Mathematics 16A-16B-16C; Genetics 100; sculpture course, art practice.

Health Care Administration

A public administration or business management orientation is recommended for the baccalaureate and master's degree work. Schools of public health and graduate school programs in administration offer professional training. Entrance requirements vary greatly from program to program. The Graduate Record Exam (GRE) or Graduate Management Aptitude Test (GMAT) is required for admission to most schools. Contact the school of your choice for particular requirements. Elective courses may be selected from the following subject areas:

Agricultural Economics
Applied Behavioral Sciences
Biological Sciences
Community Health
Economics
Engineering
English
Epidemiology and Preventive Medicine
Food Service Management
History
Mathematics
Statistics or Agricultural Science and Management,

Computer Science Engineering
Political Science
Psychology
Rhetoric
Sociology

Medicine

Most students complete four years of preprofessional course work prior to admission to medical school. Any major is appropriate for admission. The Medical College Admission Test must be taken at least one year prior to expected date of admission. Check individual medical college catalogs or contact the Health Sci-
ences Advising Office, South Hall, for specific requirements for each school. The following courses are required by most schools.

Biological sciences: six quarters, including one year of laboratory. (Biological Sciences 1A, 1B, Physiology 110, 110L, Microbiology 2 or 102, and 3 recommended).

Chemistry one year general inorganic (Chemistry 1A-1B-1C) and one year organic, with laboratory (e.g., Chemistry 128A-128B-128C and 129A-129B-129C).

Physics: one year, with laboratory (e.g., 5A, 5B, 5C).

English: one year (e.g., English 1, 3, 103).

Mathematics: one year of calculus (e.g., Mathematics 16A-16B-16C).

Nursing

Two years are usually required to complete prerequisites prior to admission into two- or three-year baccalaureate nursing programs. An accelerated program is also available at a limited number of universities. In addition to the general requirements listed here, students must obtain a degree in the subject of their choice. General requirements include:

Chemistry 1A, 1B, 8A, 8B.

English 1.

Human Anatomy 101, 101L.

Microbiology 2 or 102, and 3.

Physiology. Recommended: Physiology 2-2L or 110-110L.

Psychology 1.

Sociology 1.

Recommended courses include: Nutrition 10 or 101 or 110; Human Development 100A or Psychology 112; Anthropology 2; Rhetoric and Communication 3; Physics 6A, 10; Family Practice 92C, 192B; Community Health 101; Biological Sciences 19, Psychology 16; Sociology 127, 154.

Specific requirements vary from school to school and are subject to change; students are advised to contact specific schools regarding requirements. An R.N. license may also be earned through associate degree programs (A.D.N.) offered by community colleges or through hospital diploma programs.

Occupational Therapy

Basic preprofessional training may be taken either at the undergraduate or graduate level. Students must apply to another school to obtain professional training. Applicants are expected to be proficient in some arts and crafts activities and preferably knowledgeable in some industrial arts and recreational skills. Experience in the field is strongly recommended.

Biological Sciences 1A
Chemistry 1A, 1B, 1C
English 1 or 3
Human Anatomy 101, 101L
Human Development 100A-100B or Psychology 112
Physiology 2-2L or 110-110L (110-110L recommended)
Psychology 1, 168
Sociology: one course or Anthropology 2

Suggested electives: Human Development 100C, 102, 130, 131, 141; additional psychology; Physics 5A, 5B, 5C, 10; Physiology 111A-111B, 112-113; Community Health 101; Genetics 10; Nutrition 10; art and design courses; Physical Education 103, 105, 113, 125, 131; Family Practice 92C, 192B; Rhetoric and Communication 1, 3; Microbiology 2, 3. CSU San Jose requires a "skills" course (i.e., drawing, ceramics, weaving).

Optometry

Two to five years minimum preparation is required prior to admission into a four-year Doctor of Optometry degree curriculum. Students must participate in the Optometry Admission Testing Program, one year prior to projected date of admission. Inquire at the Health Sciences Advising Office for test dates. Check individual catalogs for exact prerequisites.

General Biology and/or Zoology: Biological Sciences 1A, 1B, and one upper division elective in Biological Sciences or Zoology;

Microbiology 2 or 102, and 3;

Human Anatomy 101 and 101L;

Physiology 110 and 110L (required only by UC Berkeley)

Chemistry: one year of general (Chemistry 1A, 1B, 1C) and two quarters of organic with laboratory (e.g., Chemistry 8A, 8B). Required by a few schools: 9 units of organic chemistry.

English: one year (e.g., English 1, 3, 103). Rhetoric courses may fulfill this requirement.


Physics 5A, 5B, 5C.

Psychology: two courses, Psychology 1 and one upper division course (e.g., Psychology 112, 168).

Suggested electives: economics, sociology, biochemistry, additional biological sciences, additional statistics.

Pharmacy

One to two years minimum preprofessional course work is required prior to admission to professional training. Students may be required to take the Pharmacy College Admission Test one year prior to projected date of admission. Each school has its own requirements; experience in the field is highly recommended. Check individual catalogs.

Biological sciences (one year with laboratory). Zoology 100; Microbiology 2 or 102, 3; Biological Sciences 1A, 1B, 1C.

Chemistry: one year of inorganic chemistry with laboratory (Chemistry 1A-1B-1C); one year of organic with laboratory (Chemistry 128A-128B-128C-129A-129B-129C). UCSF requires Chemistry 5. UOP B.S. degree program has general education requirements but does not require organic chemistry.

Economics. One macroeconomics course (Economics 1B).
English, one year: one each of composition, literature and one other.
Mathematics 16A-16B (-16C required by some schools) and Statistics 13 (recommended).
Physics: one year physics with laboratory (Physics 5A, 5B, 5C).
Psychology: one course, such as Psychology 1.
Rhetoric and Communication 1, 3 or 10.
Suggested electives: courses in behavioral psychology; speech, communication, sociology, anthropology, history, and political science.

**Physical Therapy**
Basic preprofessional training is available for both the undergraduate and graduate levels; students must obtain professional training from another school. Each physical therapy program has its own specific requirements; therefore, students should contact the school of their choice. Experience in the field is strongly recommended. Most graduate programs require the Graduate Record Exam (GRE) for admission. General requirements include:

- Biological Sciences 1A
- Chemistry: 1A, 1B, 1C, Recommended: 8A, 8B
- Computer Science Engineering 10. Required by some schools
- English, one year
- Human Anatomy 101, 101L
- Physics, one year
- Physiology 110-110L (required by majority of schools)
- Psychology 1 and 158
- Statistics 13
- Suggested electives: Biological Sciences 1B; Human Development 100A-100B or Psychology 112; Human Development 100C, 131, 141; Microbiology 2 and 3; Sociology 1, 3; Zoology 106, 143; Anatomy 215; Physical Education 101, 102, 103, 105, 113, 125, 131; Rhetoric and Communication 1, 3; Community Health 101 (required only by University of the Pacific); Family Practice 192B; additional psychology, and additional biology.

**Physician Assisting**
Physician assistant programs often require courses in English composition, sociology, psychology, chemistry, anatomy, physiology, microbiology, mathematics, and cultural anthropology. Additionally, one to two years of direct patient care (i.e., nurse, nurses aide, EMT, orderly, corpsman) are normally required. The majority of the programs are for training people who are interested in assisting the primary care physician in underserved areas; however, specialty training is available. Physician's assistants work in a wide variety of settings.

**Speech Therapy**
Students must apply to another school for professional training through a master's degree or special teaching credential program.

Speech therapy and audiology programs are highly specific in their entrance requirements at both the undergraduate and graduate levels. UC Davis offers courses that satisfy a few of the requirements, however, it has no preprofessional major for these fields. For information on courses at Davis which are acceptable toward specific programs in speech therapy and audiology, you may contact either the Health Sciences Advising Office or the professional program in which you are interested.

**School of Medicine, UC Davis:** Consult this catalog, the School of Medicine Bulletin, or the Office of Student Affairs, School of Medicine, 916-752-3170.

**School of Veterinary Medicine, UC Davis:** Consult this catalog, the Announcement of the School of Veterinary Medicine, or the Office of Student Services, School of Veterinary Medicine, 916-752-1383.

**REFERENCE BOOKS**
School catalogs and reference texts are available in the Periodicals Room of the Shields Library, the Health Sciences Library, or the Health Sciences Advising Office.

Some recommended publications are as follows:

- American Universities and Colleges, edited by the American Council on Education.
- Graduate Programs and Admissions Manual, published by the Graduate Record Examination Board and the Council of Graduate Schools in the United States.
- Admission Requirements of American Dental Schools, published by the American Association of Dental Schools.
- Admissions to Schools and Colleges of Optometry, published by the American Optometric Association.
- Medical School Admission Requirements U.S. and Canada, published annually by the Association of American Medical Colleges.
- Pharmacy School Admission Requirements, published annually by the American Association of Colleges of Pharmacy.
School of Law
Deadline

February 1 Deadline for filing applications for admission for 1991-92 to the School of Law

General Information

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 offers professional training in interviewing, 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, 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-law program. Your college record and LSAT 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—Pre-Law Handbook, 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 2000, Newtown, PA 18940.

ADMISSION

Requirements for Admission

Your application for admission to the School of Law must show a record of sufficiently high caliber to demonstrate your ability to handle the rigors of law study. A bachelor's degree or an equivalent degree from an approved college or university must be earned prior to the time you begin work in the School.

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.

Law School Admission Test (LSAT)

All applicants are required to take the Law School Admission Test administered by Law Services. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October, and December. If at all possible, you should take the test by October, and in any event not later than December, for admission the following fall. The completed test application blank, accompanied by the fee, must be postmarked at least 30 days before the date of the test to ensure the applicant’s being registered.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law School Admission Test, Law Services, Box 2000, Newtown, PA 18940. The information booklet is also available in the Law School Admission Office and the Prelaw Advising Office on campus.

Admission Procedures

Complete details of admission procedures are included in the Law School Catalog.

1. Application for admission to the School of Law and to the Graduate Division of the University for the program leading to the degree of Juris Doctor should be made on forms supplied by the School. Application forms and the School catalog may be requested from the Office of Admissions, School of Law, University of California, Davis, CA 95616. The completed application must be returned to that same office, accompanied by a $40 nonrefundable application fee in the form of a check or money order 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 received after February 1 will be considered but because applicants are admitted as promptly as possible, late applicants will be at a disadvantage.
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, Black, Hispanic, Native American, 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 Scholarships, Inc., 5106 Grant Avenue N.E., Albuquerque, New Mexico 87108. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is June 1.

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, 26 Geary Street, 6th Floor, San Francisco, CA 94108.

PROFESSIONAL CURRICULUM AND DEGREE

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, course work may be divided between the Law School and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with 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 a M.Admin. 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 prior to 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.

**SEMESTER SYSTEM**

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

**Academic Calendar 1990-91**

<table>
<thead>
<tr>
<th></th>
<th>Fall 1990</th>
<th>Spring 1991</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program</td>
<td>Mon-Fri, Aug 20-24</td>
<td>Mon, Jan 14</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 27</td>
<td></td>
</tr>
<tr>
<td>Labor Day holiday</td>
<td>Mon, Sept 3</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving holiday period</td>
<td>Thurs-Fri, Nov 22-23</td>
<td></td>
</tr>
<tr>
<td>Martin Luther King, Jr holiday</td>
<td></td>
<td>Mon, Jan 21</td>
</tr>
<tr>
<td>President's Day holiday</td>
<td></td>
<td>Mon, Feb 18</td>
</tr>
<tr>
<td>Spring recess</td>
<td>Mon-Fri, Mar 25-29</td>
<td></td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 7</td>
<td>Fri, May 3</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Tues, Dec 8-11</td>
<td>Sat-Wed, May 4-8</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Wed-Sat, Dec 12-22</td>
<td>Thurs-Fri, May 9-24</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Sat, Dec 22</td>
<td>Fri, May 24</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td>Sat, May 25</td>
<td></td>
</tr>
</tbody>
</table>

*Friday, February 22, is treated as a Monday for class schedule purposes.

**APPLICATION MATERIALS**

The catalog of the School of Law and application materials may be obtained by writing to the Office of Admission, School of Law, 115 King Hall, University of California, Davis, CA 95616.
Deadline
April 1 Deadline for filing applications for admission for 1991-92 to the School of Management

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 course work prior to enrollment in the program:

Economics—the introductory courses in micro- and macroeconomics, and one upper division course in microeconomics (Economics 100).

Mathematics—an introductory course in calculus (Mathematics 16A).

Statistics—one course in elementary statistics (Statistics 13).

Well-developed English reading and writing skills are essential for success in the program.

APPLICATION
Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management and must be completed and returned, with all supporting documents, by April 1. In order to allow the timely processing of your application, we have established a deadline of April 1. However, your application may be considered after the deadline. Completed applications for fellowship and graduate scholarships must be filed by January 15.

As indicated in the application form, the basic documents required are:

- transcripts from all institutions of higher education previously attended;
- scores from the Graduate Management Admission Test (GMAT);
- three letters of recommendation;
- a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not a requirement, although visits from applicants are welcomed.

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.

The Graduate School of Management of the University of California, Davis, prepares men and women for management careers in business, government, and nonprofit enterprise. The School offers the principal components of leading graduate programs of business management in a two-year course of study leading to the Master of Business Administration degree. The Graduate School of Management admitted its charter class in the fall of 1981, and the planned enrollment at maturity is 300.

The two-year 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.

The program has a first-year core which emphasizes concepts and techniques appropriate to management in either the public or private sector so that students, no matter what their special career interests, are prepared to function in either sphere. Courses in the core cover economic analysis, policy analysis, quantitative methods, accounting, budget and control, marketing, finance, and organizational theory. During the second year, students specialize in one of several concentrations including Accounting, Agricultural Management, Environmental and Natural Resource Management, Finance, Management Information Systems, Management Science, Marketing, Public Sector Management, Science and Engineering Management, each with an emphasis in either the public or private sector. Joint degrees in Engineering and Management and Law and Management are also offered. The Graduate School of Management is able to accept well-qualified students into an individualized Ph.D. program. The program is administered by the Graduate Division, but students who are interested should write directly to the Graduate School of Management.

Strong emphasis is placed on individual attention, real-world problem solving, and group dynamics through study groups, teamwork, and special subjects.
Deadline

November 1  Deadline for filing applications for admission for 1991-92 to the School of Medicine

General Information

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.

ADMISSION POLICIES

The class entering in the fall will be limited to ninety-three students selected on the basis of academic achievement, academic promise, and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in the entering class will be awarded to students who are legal residents of the State of California. The School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE). Further information may be obtained by communicating with this Commission at Post Office Drawer P, Boulder, CO 80302.

Applicant Selection. 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.

Application Procedures

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request forms are available from the School's Admissions Office after March 15 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. The completed application and other required credentials should be submitted 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 two letters of recommendation along with a nonrefundable application fee of $40. These items should be sent 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. It is required that one letter be from a science instructor and the other from a non-science instructor.

Applications will be accepted by the Admissions Committee between June 15 and November 1. It is strongly recommended 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 notifies you of receipt of your completed application from AMCAS. The Committee reviews only complete application forms 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. It is highly desirable that 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. Where circumstances warrant, interviews may be arranged by the Admissions Committee at other locations.

You will be notified of your status as soon as possible after a decision has been reached. 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.

Transfer with Advanced Standing

Students may be admitted by action of the Admissions Committee at levels more advanced than the regular entering level but not beyond the beginning of the third year. Such applicants must meet the
entrance requirements for regular status in the School of Medicine, must satisfactorily complete courses elsewhere that are substantially equivalent to those offered in the School of Medicine, and must meet the necessary requirements for the advanced status requested. Applicants may also be required to pass examinations to establish their qualifications for admission. An advanced standing applicant must be a student in good standing at an approved medical school. At UCD, the second-year classes begin work in early August and third-year classes begin work in early July. Applications for admission to advanced standing will be accepted until January 1 of the year in which admission is sought.

**Premedical Scholastic Requirements**

The New Medical College Admission Test (MCAT) results must be available when your application is reviewed, so you should take the MCAT by the spring prior to application. Information can be obtained at your undergraduate institution or directly from MCAT Registration, Box 414, Iowa City, Iowa 52340. To be acceptable, the MCAT must have been taken no earlier than 36 months prior to the date of application and no later than the fall prior to the year of anticipated matriculation.

Beginning with the class entering the School of Medicine in fall 1990, each applicant for admission:

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>English, 1 year or its equivalent</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Biological science, 1 year</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>including laboratory, or its</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equivalent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General chemistry, 1 year</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>including laboratory, or its</td>
<td></td>
<td></td>
</tr>
<tr>
<td>equivalent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic chemistry, 1 year</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>or its equivalent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If two or more undergraduate</td>
<td></td>
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</tr>
<tr>
<td>organic chemistry courses are</td>
<td></td>
<td></td>
</tr>
<tr>
<td>offered, it is recommended that you</td>
<td></td>
<td></td>
</tr>
<tr>
<td>elect the more rigorous option.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics, 1 year or its equivalent</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics, course work</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>sufficient to satisfy prerequisites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for integral calculus. (Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>work through integral calculus is</td>
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<td></td>
</tr>
<tr>
<td>recommended. You will find helpful</td>
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<td></td>
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<tr>
<td>experience and knowledge gained in</td>
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<td></td>
</tr>
<tr>
<td>biochemistry, genetics, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>embryology.)</td>
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</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 or request the School of Medicine Bulletin from the medical school Admissions Office.

**School of Medicine Calendar 1990-91**

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

**SUMMER QUARTER 1990**

| Instruction begins for 3rd- and 4th-year students | Mon, July 2 |
| Instruction begins for 2nd-year students (electives) | Mon, July 2 |
| Instruction begins for 2nd-year (regular curriculum) | Mon, July 30 |
| Instruction ends for 2nd-year students | Mon, Sept 10 |
| Final exams for 2nd-year students | Sept 12-14 |
| Instruction ends for 3rd- and 4th-year students | Fri, Sept 21 |
| Academic and administrative holidays | Wed, July 4 |
|                                                   | Mon, Sept 3 |

**FALL QUARTER 1990**

| Instruction begins for 3rd- and 4th-year students | Mon, Sept 24 |
| Instruction begins for 1st- and 2nd-year students | Thurs, Sept 27 |
| Exam and study period for 1st-year students | Nov 5-9 |
| Exam and study period for 2nd-year students | Nov 8-14 |
| Instruction ends for 1st- and 2nd-year students | Fri, Dec 7 |
| Final exams for 1st- and 2nd-year students | Dec 10-14 |
| Instruction ends for 3rd- and 4th-year students | Fri, Dec 14 |
| Academic and administrative holidays | Nov 22-23 |
|                                                   | Dec 24-25 |
|                                                   | Dec 31-Jan 1 |

**WINTER QUARTER 1991**

| Instruction begins for 2nd- to 4th-year students | Wed, Jan 2 |
| Instruction begins for 1st-year students | Mon, Jan 7 |
| Exam and study period for 2nd-year students | Feb 7-13 |
| Exam and study period for 1st-year students | Feb 12-15 |
| Instruction ends for 2nd-year students | Wed, Mar 13 |
| Final exams for 2nd-year students | Mar 14-20 |
| Instruction ends for 1st-year students | Mon, Mar 18 |
| Final exams for 1st-year students | Mar 19-26 |
| Instruction ends for 3rd- and 4th-year students | Fri, Mar 22 |
| Academic and administrative holidays | Mon, Jan 21 |
|                                                   | Mon, Feb 18 |

**SPRING QUARTER 1991**

| Instruction begins for 2nd- to 4th-year students | Tues, Mar 26 |
| Instruction begins for 1st-year students | Mon, April 1 |
| Exam and study period for 2nd-year students | Apr 22-24 |
| Exam and study period for 1st-year students | May 6-10 |
| Instruction ends for 2nd-year students | Wed, May 22 |
| Final exams for 2nd-year students | May 24-29 |
| Instruction ends for 4th-year students | Thurs, June 6 |
| Instruction ends for 1st-year students | Fri, June 7 |
| Final exams for 1st-year students | June 10-14 |
| Instruction ends for 3rd-year students | Fri, June 14 |
| Academic and administrative holidays | Mon, Mar 25 |
|                                                   | Mon, May 27 |
School of Veterinary Medicine
Deadline

November 1 Deadline for filing applications for admission for 1991-92 to the School of Veterinary Medicine

General Information

The Doctor of Veterinary Medicine (D.V.M.) degree is granted upon completion of a course of study that usually requires six years. The final four years must be spent in the professional veterinary medical curriculum. Many students planning a career in veterinary medicine broaden their educational experience by completing the baccalaureate degree before applying to the professional school.

PREPROFESSIONAL TRAINING AND REQUIREMENTS

Applicants must have completed 108 quarter units (72 semester units) in an accredited college or university before entering the School of Veterinary Medicine. Courses taken at other institutions may vary in units.

You should plan your pre-veterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. The undergraduate program should include plans for obtaining a baccalaureate degree. 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) which 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. Substantial experience with animals, which should include working with veterinarians, is required. This experience should entail more than having had family pets. The requirement can be fulfilled with 4 1/2 week-equivalents (180 hours) if it includes relevant experience with types of activities that give an appreciation and understanding of the profession of veterinary medicine. This should include experience with several animal species so as to understand the breadth of the profession. The Admission Committee will evaluate animal experience qualitatively. Evaluation of animal experience is derived from the application, narrative and letters of evaluation. The experience requirement must be met in order to have an application evaluated by the Admission Committee.

Subject Requirements

Science courses

<table>
<thead>
<tr>
<th>Lower Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry (general, qualitative, organic, including laboratories)</td>
</tr>
<tr>
<td>Physics (general, no laboratory required)</td>
</tr>
<tr>
<td>Biology (no laboratory required)</td>
</tr>
<tr>
<td>Zoology (including laboratory)</td>
</tr>
<tr>
<td>Upper Division</td>
</tr>
<tr>
<td>Genetics (no laboratory required)</td>
</tr>
<tr>
<td>Embryology (no laboratory required)</td>
</tr>
<tr>
<td>English composition and additional English or Rhetoric and Communication</td>
</tr>
<tr>
<td>Statistics</td>
</tr>
<tr>
<td>Humanities and/or Social Sciences</td>
</tr>
<tr>
<td><strong>Total 73</strong></td>
</tr>
</tbody>
</table>

Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

Units

<table>
<thead>
<tr>
<th>Lower Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, (5)</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 8A, 8b, (5,5,5,3,3)</td>
</tr>
<tr>
<td>Physics 1A, 1B, (3,3)</td>
</tr>
<tr>
<td>Biological Sciences 1B, (5)</td>
</tr>
<tr>
<td>English 1 and additional English or Rhetoric and Communication, (4,4,4)</td>
</tr>
<tr>
<td>Statistics 13 or Agricultural Science and Management 150, (4,4,4)</td>
</tr>
<tr>
<td>Humanities and/or Social Sciences, (4,4,4)</td>
</tr>
<tr>
<td><strong>Total 73</strong></td>
</tr>
</tbody>
</table>

If you complete the requirements in an institution other than the University of California, Davis, you are urged to check carefully the catalog of your college to be sure you are taking courses comparable in content.

Application Procedures

Students are admitted to the School of Veterinary Medicine only in the fall. Applications may be obtained any time after July 1 by writing to the Office of the Associate Dean—Student Services, School of Veterinary Medicine, University of California, Davis, CA 95616 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. All applicants are required to take the General Aptitude (including Analytical) and Subject Test in Biology of the Graduate Record Examination (GRE). GRE SCORES RECEIVED FROM THE NOVEMBER ADMINISTRATION OR LATER ADMINISTRATIONS FOR THE YEAR THE APPLICATION IS FILED WILL NOT BE ACCEPTED FOR CONSIDERATION. Applications for the examinations and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470.

The GRE must be taken within the five-year period prior to the time the application is submitted. The highest scores will be used when the GRE is taken more than once.

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 Services or by calling 916-752-1806.

Admission to the School of Veterinary Medicine

Evaluation is based on academic and nonacademic records. The academic record is divided into the required science grade-point average, cumulative grade-point average, and grade-point average for the last two years of undergraduate studies. The scores from the Graduate Record Examination are included in the evaluation of your academic record. The principal nonacademic criteria are your narrative statement, letters of evaluation, and personal interview. Other criteria considered helpful by the Faculty Committee and Dean of the School of Veterinary Medicine may be used in the selection process. The minimum acceptable grade-point average for an applicant to be considered for admission to the School is 2.50 in both the required science units and the cumulative undergraduate work.

Since scholastic achievement in the required science courses is a very important criterion for admission to the School, the Passed/Not Passed option should be avoided.

Work-experience with animals and a familiarity with the veterinary medical profession are considered significant factors in demonstrating motivation and a sincere interest in the profession. Comprehensive letters of evaluation are an important consideration in the review of an application.

Residents of the state of California will be given priority for admission to the School of Veterinary Medicine. 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 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 the Statement of Legal Residence in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst — Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency.

Any applicant applying for admission to the School of Veterinary Medicine from a state other than California, must enclose with his or her application, course descriptions of all required science courses. This may be accomplished by sending current school catalogs or by copying relevant course descriptions from school catalogs.

In addition, applicants who have received part or all of their education in a country other than the United States must include: 1) a certified English version of their college transcripts; and 2) if English is their second language, official scores from the Test of English as a Foreign Language (TOEFL) examination taken within the five-year period prior to the time the application is submitted.

DEGREES

Requirements for the Bachelor of Science Degree in Veterinary Science

Any student in the School of Veterinary Medicine who does not hold a baccalaureate degree, but has satisfactorily completed the first two years of the professional curriculum and has satisfied the general University requirements (see the Bachelor's Degree Requirements section in this catalog), is eligible to receive a Bachelor of Science degree in Veterinary Science.

Requirements for the Doctor of Veterinary Medicine Degree

A candidate for the Doctor of Veterinary Medicine degree must comply with the following requirements:

- Fulfill the academic standards set forth by the faculty of the School of Veterinary Medicine
- Possess good moral character
- Complete the bachelor's degree requirements in one of the colleges or schools of the University of California or at another accredited college or university
- 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)
- Maintain a grade-point average of 2.0 (C), computed on all courses taken in the School
The Master of Preventive Veterinary Medicine Degree

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. An option should be selected from the four listed below at the time of application. Completed application materials must be submitted no later than ninety days prior to the quarter of planned enrollment. Application forms can be requested from the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

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 Management**: statistics, epidemiology, animal health economics, and disease control
   Adviser: W. Hird

2. **Veterinary Public Health**: veterinary medicine applied to food safety and zoonoses
   Adviser: C. Genigeorgis

3. **Laboratory Science**: roles of diagnostic laboratories in animal disease surveillance and disease control
   Adviser: R. Yamamoto

4. **Veterinary Programs Administration**: administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service
   Adviser: C. W. Schwabe

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

The Master of Science and Doctor of Philosophy Degrees

General information regarding these degrees will be found in the Announcement of the Graduate Division, which may be obtained from the Graduate Division on the Davis campus. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.
Programs and Courses
COURSE DESIGNATIONS

The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class hours and room numbers, changes to the General Catalog, and the most up-to-date information on registration and enrollment procedures. A supplement with changes to the General Catalog and the Class Schedule and Room Directory is available for Fall quarter.

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

1. 190. Proseminar in International Agricultural Development (1) I, II, III. The Staff Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff, and students. May be repeated for credit. (PINP grading only)

Top line: course number; title; units; quarters offered; instructor(s).

Paragraph following: course setup; prerequisite; description; grading if other than letter grading.

The quarter in which a course is intended to be given is shown as follows:*

I. Fall Quarter (September to December)
II. Winter Quarter (January to March)
III. Spring Quarter (April to June)
IV. Summer Quarter (July to September) for students in the College of Agriculture only

*Courses in the School of Medicine:
I. refers to Fall Semester (August - December)
II. refers to Spring Semester (January - May)

When a course is listed to be offered in even-numbered years or odd-numbered years only, the year involved would be that in which the quarter occurs, e.g., fall quarter 1990 would be an even-numbered year and winter and spring quarters 1991 would be odd-numbered years.

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.

PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements is entirely 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, a prerequisite that requires that you complete 84 units before enrolling may not be waived.

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.

Variable-Unit Courses (see Academic Information section for enrollment procedures) include:

- 92 (Internship) courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities.

- 97T (Tutoring) and 97TC (Tutoring in the Community) courses allow students to tutor in a subject in which they are proficient—generally in their major field—while enrolled as undergraduates.

- 98 (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 which cannot be accommodated within the formal course structure.

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., 1AT - 1ATB - 1ATC, 31ATA, 31ATB.

California Articulation Number (CAN) System. UC Davis participates in the CAN System. This system uses a common number to identify some of the transferable, lower division, introductory courses commonly taught within each academic discipline on California college campuses. The system assures students that CAN courses on one participating campus will be accepted "in lieu of" the comparable CAN courses on another participating campus. For example: CAN Economics 2 on one campus will be accepted for CAN Economics 2 on another participating campus. Each campus, however, retains its own numbering system.

In this catalog, the CAN designator is found at the end of the course description of each approved CAN course (e.g. CAN Anth 2, CAN Econ 1A).

For additional information contact the Relations with Schools/EOP Outreach Office, 916-757-3108.

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 (see Academic Information section for enrollment procedures) for upper division credit include:

- 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 prior to enrollment.

- 194H (Special Study for Honors Students) courses are for individual students with honor status, as determined by the department offering the course, and who have completed 84 units.
• 197T (Tutoring) and 197TC (Tutoring in the Community) are the upper division counterparts of 97T and 97TC.

• 198 (Directed Group Study) courses are the upper division counterparts of course 98, and are for students judged to have adequate background in the subject proposed for study.

• 198 (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.

Autotutorial Courses can also be upper division courses (see under Lower Division Courses). Such courses would read, e.g., 105AT, 119AT, 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 students 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 (1) 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. (2) Also included are courses for certification of family nurse practitioners and physician assistants. These courses are open only to students enrolled in those programs.

OTHER PROFESSIONAL COURSES

Courses numbered 400-499 are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Division before enrolling in 400 series courses to determine if graduate credit may be awarded for the course in question (also note the dagger (†) footnote in prerequisites).

Note: Undergraduates should refer to their college’s section regarding any restrictions on degree credit for courses in the 200, 300, or 400 series.

KEY TO FOOTNOTE SYMBOLS

The following symbols are used throughout the Programs and Courses section to indicate:

* Not to be given 1990-91
† Approved for graduate degree credit
1 Absent on leave, 1990-91
2 Absent on leave, Fall Quarter 1990 (Semester, for Law School)
3 Absent on leave, Winter Quarter 1991
4 Absent on leave, Spring Quarter 1991 (Semester, for Law School)
5 In residence at President’s Office (University Administration)
6 In residence at another campus

The course offerings listed in this catalog are subject to change without notice. For more current quarter offerings, refer to the Class Schedule and Room Directory available in the UCD Bookstore. A Supplement to the Class Schedule and Room Directory and General Catalog is published for fall quarter.
Afro-American Studies
(College of Letters and Science)
Vincent Crockenberg, Ph.D., Acting Director
Program Office, 467 Kerr Hall (916-752-1548)

Committee in Charge
Cynthia Brantley, Ph.D. (History)
Richard T. Curling, Ph.D. (Anthropology)
Carl C. Jorgensen, Ph.D. (Sociology)
Clarence Major, Ph.D. (English)
Marc Pilus, Ph.D. (Applied Behavioral Sciences)
Patricia Turner, Ph.D. (Afro-American Studies)
Clarence E. Walker, Ph.D. (History), Chairperson
David Scofield Wilson, Ph.D. (American Studies)

Faculty
Jacqueline Mitchell, Ed.D., Associate Professor
Patricia Turner, Ph.D., Assistant Professor

The Major Program
The Afro-American Studies Program provides students with direct intellectual exposure to the ideas, lifestyles, history, and political behavior of Black peoples throughout the world. Though the courses offered by the Program are disproportionately offered by students concerned with Afro-American Studies, affiliated courses offered by instructors formally housed in other departments throughout the University broaden students' access to courses on Africa, Afro-America, and other Black experiences throughout the diaspora. Students who choose an Afro-American Studies major or minor should anticipate a close working relationship with a faculty member.

Upon completion of this program, students will be prepared for graduate work in any discipline requiring a broad social science background.

A.B. Major Requirements:

Preparatory Subject Matter

UNITS
Preparatory Subject Matter

36
Afro-American Studies 10

8
Two courses from Anthropology 2, Economics 1A, 1B, Geography 2, Sociology 1, Political Science 1, 2, Psychology 1, 3, 6

15
Two courses from Chicano Studies 10, Native American Studies 10, 10, American Studies 1, 11, 20, 21, African Studies 10, 11, 20, 21

14
History 27A, 27B

8
Music 20

4
One course from Statistics 13, Sociology 46A, or Psychology 41

4

Dependent Subject Matter

A coordinated program of upper division courses, selected and approved in consultation with the major advisers to include:

Core courses: Afro-American Studies 101, 110, 120, 121, 130

Additional upper division courses chosen to reflect the student's major emphasis

Total Units for the Major

72

Major Program Emphasis

The following areas of emphasis are offered as a guideline for students interested in majoring in Afro-American Studies

Culture of Afro-American orientation:

Afro-American Studies 107, 120, 121; Anthropology 140A, 140B, History 177A, 177B; Political Science 167.

African emphasis:

Afro-American Studies 107, 120, 121; Anthropology 140A, 140B, History 115A, 116; Political Science 134, 146.

NOTE: For key to footnote symbols, see page 133.
Agrarian Studies
(College of Agricultural and Environmental Sciences)

The Major Program
Agrarian Studies is a multidisciplinary program designed for students who seek the "bread-view" and are challenged by the scientific, philosophical, and cultural concepts important to an understanding of agriculture and its relationship to man. Through a purposeful integration of science and the humanities, the major provides a sound general education important for effective leadership in agriculture and in many agriculturally or environmentally related aspects of business, government, international services, or teaching. Depth of understanding in your field of agricultural interest is achieved by the selection of specialized complementary courses or, for those who qualify, by the Senior Honors Thesis.

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.)

Written/Oral Expression .......................... 8
See College requirement) ......................... 8

Social Sciences and Humanities .......................... 42
Cultural anthropology or geography
(Anthropology 2 or Geography 2-25) .......... 4
Philosophy of biological sciences (Philosophy 10G or 108) ...... 4
Introduction to economics (Economics 1A, 1B, Agricultural Economics 120) .......... 14
Restriction: Economics 15A, 15B, 15F, 15G .............. 20
Additional courses selected in consultation
with adviser in 3 or more of the following:
agricultural economics, American studies, anthropology, classics, economics, geography, history, languages, t political science, rhetoric, sociology).

Natural Sciences .......................... 67-68
Chemistry (Chemistry 1A, 1B, 5A, 8B) ............ 16
Biochemistry (Biochemistry 101A, 101B) and/or upper division plant or animal
physiology ............................................ 8
Mathematics (Mathematics 16A plus two of the
following: Mathematics 16B, Agricultural
Science and Management 21, 150, Computer Science Engineering 30) .......... 30
Sociology (Sociology 101) .......................... 10-11

Agrarian Studies Emphasis
Perspectives on agriculture (Agrarian Studies 2) ............ 4
Geography of agriculture (Geography 142) .......... 4
Food and culture (Food Science and Technology 20) .......... 4
History of U.S. agriculture (History 188A, 188B) ............ 8

Agricultural Specialization ................. 30
Major field ............................................. 18
Courses chosen to provide depth of understanding in one of the following or closely allied fields: animal sciences, food sciences, plant sciences, resource sciences, international agricultural development.

Complementary field .......................... 12
Senior Honors Thesis (Agrarian Studies 188H) OR closely related courses in
either the natural sciences (e.g., entomology, physiology, soil and water science,

Lower Division Course
2. Perspectives on Agriculture (4). II. Romani
Lecture-3 hours; discussion-1 hour; one all-day field trip. Prerequisite: introductory course in the chemical or biological sciences recommended. Introduction to agrarian studies, exploring agriculture's vital role in past civilizations and in current societies. A review of important connections between agriculture and the natural and social sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10.

Upper Division Course
188. Special Topics in Agrarian Studies (1) III.
Romani
Discussion-1 hour. Prerequisite: course 2 or consent
of instructor; open to lower division students. Group study of special topics on the relationships between agriculture and the arts and sciences. May be repeated for credit.

188H. Senior Honors Thesis (2-6). II, III. Romani
Independent study-2 to 6 hours; thesis. Prerequisites: Agrarian Studies major; senior standing; overall GPA of 3.25 or higher; consent of major adviser. Two or three successive quarters of guided, scientific and/or scholarly research on an agriculturally-related subject of special interest to the student. (PINP grading only) (Deferred grading only, pending completion of thesis.)

Agrarian Studies
B.S. Major Requirements:

Written/Oral Expression .......................... 8
See College requirement) ......................... 8

Social Sciences and Humanities .......................... 42
Cultural anthropology or geography
(Anthropology 2 or Geography 2-25) .......... 4
Philosophy of biological sciences (Philosophy 10G or 108) ...... 4
Introduction to economics (Economics 1A, 1B, Agricultural Economics 120) .......... 14
Restriction: Economics 15A, 15B, 15F, 15G .............. 20
Additional courses selected in consultation
with adviser in 3 or more of the following:
agricultural economics, American studies, anthropology, classics, economics, geography, history, languages, t political science, rhetoric, sociology.

Natural Sciences .......................... 67-68
Chemistry (Chemistry 1A, 1B, 5A, 8B) ............ 16
Biochemistry (Biochemistry 101A, 101B) and/or upper division plant or animal
physiology ............................................ 8
Mathematics (Mathematics 16A plus two of the
following: Mathematics 16B, Agricultural
Science and Management 21, 150, Computer Science Engineering 30) .......... 30
Sociology (Sociology 101) .......................... 10-11

Graduate Studies
Perspectives on agriculture (Agrarian Studies 2) ............ 4
Geography of agriculture (Geography 142) .......... 4
Food and culture (Food Science and Technology 20) .......... 4
History of U.S. agriculture (History 188A, 188B) ............ 8

Agricultural Specialization ................. 30
Major field ............................................. 18
Courses chosen to provide depth of understanding in one of the following or closely allied fields: animal sciences, food sciences, plant sciences, resource sciences, international agricultural development.

Complementary field .......................... 12
Senior Honors Thesis (Agrarian Studies 188H) OR closely related courses in
either the natural sciences (e.g., entomology, physiology, soil and water science,

Unrestricted Electives .......................... 12-13
Total Units for the Major .......................... 180

Major Adviser: R. J. Romani (Pomology).

Courses in Agrarian Studies
Questions pertaining to the following courses should be directed to the instructor or to the Pomology Department, 10:02 Wicken Hall.

Lower Division Course
2. Perspectives on Agriculture (4). II. Romani
Lecture-3 hours; discussion-1 hour; one all-day field trip. Prerequisite: introductory course in the chemical or biological sciences recommended. Introduction to agrarian studies, exploring agriculture's vital role in past civilizations and in current societies. A review of important connections between agriculture and the natural and social sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10.

Upper Division Course
188. Special Topics in Agrarian Studies (1) III.
Romani
Discussion-1 hour. Prerequisite: course 2 or consent
of instructor; open to lower division students. Group study of special topics on the relationships between agriculture and the arts and sciences. May be repeated for credit.

188H. Senior Honors Thesis (2-6). II, III. Romani
Independent study-2 to 6 hours; thesis. Prerequisites: Agrarian Studies major; senior standing; overall GPA of 3.25 or higher; consent of major adviser. Two or three successive quarters of guided, scientific and/or scholarly research on an agriculturally-related subject of special interest to the student. (PINP grading only) (Deferred grading only, pending completion of thesis.)

Agricultural and Home Economics Education
(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

Major Programs and Graduate Study, An under-graduate program leading to a bachelor of science degree is offered in Agricultural Education. For graduate study refer to the Graduate Division section in this catalog.


Courses in Agricultural and Home Economics Education
Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center, 101 AOB 4.

Lower Division Course
92. Internship (1-12) II, III. The Staff (Chairperson in charge)
Field placement—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (PINP grading only)
Upper Division Courses

100. Concepts in Education (2) I. Pershing, Goldman
   Lecture—2 hours; field observations. Prerequisite: upper division standing. Examination of educational institutions. Implications for those entering careers in teaching. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

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

163. Measurement and Evaluation in Teaching (3) I. Goldman
   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. Pershing
   Discussion—1 hour; laboratory—3 hours. Concepts and principles of audio-visual communications related to education. (P/NP grading only.)

172. Multi Media Productions (3) I. Pershing
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 or consent of instructor. Theory and application of producing multi-media educational programs.

180. Consumer Education (3) III. The Staff (Goldman in charge)
   Lecture—3 hours. Prerequisite: Agricultural Economics 141 or 142 or Consumer Science 100. Examination of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels.

185. Seminar in Agricultural Education (2) II. The Staff
   Seminar—2 hours. Discussion of selected critical issues in agriculture education. May be repeated for credit with consent of instructor. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Field placement—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. Goldman, Pershing. III. The Staff
   Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. (Sect. 1, Agriculture; Sect. 2, Home Economics.) (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. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

302. Teaching Methods in Education (3) III. Goldman, Leising
   Lecture—1 hour; discussion—2 hours. Prerequisite: course 100; 300 and 301. Development of teaching strategies, with special emphasis on the design of learning experiences, instructional execution, teaching aids. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

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 Teacher Education Program; course 306B (concurrently). Development and understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

305B. Field Experience in Teaching Vocational Agriculture (5-18) I. Leising
   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.

   Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program: courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)

323. Resource Development: Agricultural Education (3) III. Leising
   Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

381. Family Life Education (3) III. The Staff (Goldman in charge)
   Lecture—3 hours. Prerequisite: upper division standing; courses on the family, sex education, and teaching methods recommended. Current topics in family life education. Review of selected research, resources, curriculum, teaching strategies, and interdisciplinary approaches to family life education at all age levels. Offered in even-numbered years.

306: Seminar: Issues in Agricultural and Home Economics Education (2) III. Pershing
   Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program: courses 306A-306B or 307. Discussion and evaluation of current issues, theories and research in home economics and agricultural education. (Sect. 1, Agriculture; Sect. 2, Home Economics.) (SUJ grading only.)

Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The major in Agricultural and Managerial Economics is designed for students planning careers or graduate study in the field of applied economics. Preparatory courses are intended to equip students for upper division coursework, while breadth subject matter gives them the opportunity to broaden their academic horizons. Depth subject matter provides an analytical framework and tools suitable for analysis of the economic behavior of consumers, firms, and markets. Options within the major permit student detailed examination of areas of interest, with emphasis on theoretical and comparative analysis.

Each student must specialize in at least one of three options: Agricultural Economics, which focuses on topics related to the production and marketing of foods and fibers; Consumer Economics, which focuses on the decision-making processes of consumer decision-making, protection, and welfare; or Managerial Economics, which focuses on topics related to evaluating financing, and managing business activities.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS Written/Oral Expression..........................10-12
See College requirement..............................7-8
Additional English (English 1, 3, 20, 102, or 103A-G)........3-4
Preparatory Subject Matter..............................35-38
Accounting (Economics 11A-11B).....................8
Computer Science (Agricultural Science and Management 21, Computer Science Engineering 19 or 39)........3-4
Economic principles (Economics 1A-1B).................10
Calculus (Mathematics 16A-16B or 21A-21B)............6-8
Statistics (Statistics 13, 103)............................8

Breadth/General Education.............................40
(see undergraduate handbook in Department Admissions Office for complete list of courses)

Agricultural and environmental sciences
(excluding agricultural economics, consumer economics, and applied behavioral sciences).

Natural sciences (excluding mathematics beyond preparatory subject matter).

Social sciences (excluding economics).

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,..............1
Quantitative methods, Agricultural Economics...........8
105, 155

Macro theory, Economics 101 or 135.....................3-5

Restricted Electives....................................28-32
(a) Agricultural Economics..............................28
At least 15 units must be chosen from Agricultural Economics 120, 130, 131,
132, 139, 140, 150. Selecting 15 units must be from upper
division courses in Agricultural Economics
and/or Economics.

(b) Consumer Economics................................32
At least 15 units must be chosen from Agricultural Economics 118A, 130, 132,
141M, 142, 143, Consumer Science 100, 135. The remaining 17 units may be
chosen from the aforementioned courses or from Agricultural Economics
120, Applied Behavioral Sciences 171, Economics 121A, 121B, 125, 130,
Environmontal Studies 160, 169A, 169B, Environmental Toxicology 101, 128,
Policical Science 100, 174.

(c) Managerial Economics..............................32
Agricultural Economics 18
At least 12 units must be chosen from Agricultural Economics 112, 118A,
118B, 136, 157, 171A, 171B. The remaining 16 units may be chosen from
the aforementioned courses or from Agricultural Economics
120, Agricultural Economics, Consumer Economics, and Economics courses,
plus any other upper division courses taken at the University in the depth subject matter.

Students graduating with this major are required to attain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses, plus any other upper division courses taken at the University in the depth subject matter.

NOTE: For key to footnote symbols, see page 133.
Courses in Agricultural Economics

Lower Division Courses

1. Economic Basis of the Agricultural Industry (4) Ill. Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California.

18. Business Law (4) I, III. Alcauskas; summer, Lecture—4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system.

49A, 49B, 49C. Field Practice (1) I, II, III. Stajusaitis Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and visits are planned to observe the various marketing aspects of Agricultural Production. Emphasis will be placed on developing the student’s understanding and awareness of economics and the role of agriculture in their application in agricultural production. (P/N grading only)

98, Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only)

98. Special Study for Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only)

Upper Division Courses

100A. Intermediate Microeconomics: Theory of Production and Consumption (4) I. Heffeln; II. Carman; III. King Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B; Mathematics 168. Theory of individual consumers and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit to students who have completed Economics 100 or the equivalent; however, Economics 100 will not serve as prerequisite to course 100B.)

100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) I. —II. Rochlin; III. Whittington 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. Cameron (Economics); II. Larson; III. Taylor Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

112. Fundamentals of Business Organization (4) I, II. Faber; 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, interpersonal conflicts and change in the organization.

113. Fundamentals of Marketing Management (4) I, II. The Staff Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm; customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; productivity life cycles; the distribution system; manufacturing, wholesaling, retailing, and transportation; government regulation and restraints. (Not open for credit to students who have completed course 136.)

118A-118B. Tax Accounting (3-3) II. Sosnick Lecture—2 hours; discussion—1 hour. Prerequisite: Economics 118B. 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) Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Use of economic theory to develop a 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/Non-Introductory. Recommended GE preparation: Economics 1A-1B.

130. Agricultural Marketing (4) I. Alston; II. Whitney Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or the equivalent. 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. The Staff 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) III. Sexton Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprises in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

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, market planning, market segmentation, determination of optimal product market mix, sales and cost analysis, conduct of marketing research, marketing models and systems.

139. Futures and Options Markets (3) I. Carter Lecture—3 hours. Prerequisite: course 100A; Statistics 103. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options policies as policy tools.

140. Farm Management (5) III. H. Carter Lecture—6 hours. Prerequisite: Economics 1A. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

141. Consumers and the Market (4) II. Helen Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects 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 credits of Economics, so must enroll for course 141.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: non-GE introductory course sequence Economics 1A-1B.

141M. Consumers and the Market (3) III. Helen Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. (Students who have had or are taking
Agricultural Economics

157. Analysis for Production Management (4) III. Logan
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analyzing production management problems, including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

*169. Economics of Energy (4) II. Witten
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or the equivalent; introductory course in calculus recommended. Economics of complex systems necessary to study energy issues. Topics include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, subsidization. Offered in even-numbered years. (Same course as Environmental Studies 189.)

171A. Financial Management of the Farm (4) III. Innes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Economics 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory; cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. (Students who have had or are taking Economics 134 may not receive credit for this course.)

171B. Financial Management of the Firm (4) II. Innes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 117A. Financial management at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.

176. Economic Analysis in Resource Use (3) III. Larson
Lecture—3 hours. Prerequisite: course 100A. Analytical treatment of resource use problems, including public policy issues; economic productivity and natural resource economics; endowments, patterns and patterns of natural resource use; resource conservation; land tenure problems and policies.

*180A. Agricultural Production Economics (4) II. Burt
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 106, 155; senior standing. Application of theory and quantitative methods to risk and uncertainty as they relate to production, resource, investment, decision, entrepreneurial, machine scheduling, crop insurance and government programs.

*190A. Senior Research Project (2) II.
Lecture—1 hour; hour—1 hour. Prerequisite: course 100A; Statistics 103 or consent of instructor. Senior standing. Individual student-defined research project conducted under faculty guidance. Problem definition, study objectives, procedure, method of analysis, working outline, and preliminary elements of report writing to be completed in the first quarter. (Deferred grading only, pending completion of sequence.)

*190B. Senior Research Project (2) III.
Lecture—1 hour; discussion—1 hour. Prerequisite: course 190A or consent of instructor. The research report begins in the second quarter and is completed and, after evaluation by the instructor, is revised and resubmitted by the student prior to the end of 190B. (Deferred grading only, pending completion of sequence.)

192. Internship (1-6) I, II, III. Summer. The Staff (Chairperson in charge)
Laboratory—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural Economics. Internships are supervised by a member of the staff. (PNP grading only.)

197T. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge)
Hours are assigned to students based upon the course being tutored. Prerequisite: senior standing in Agricultural Economics and consent of Department Chairperson.

NOTE: For key to footnote symbols, see page 133.

180A. Microeconomics Theory (Master's) II. Caputo
Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics 142. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, monopolistic, and monopolistic markets. (Same course as Economics 200A.)

200B. Microeconomics Theory (Master's) III. Helfman
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Introduction to theorems of welfare economics in a general equilibrium, linear economic models, externalities and market failure, social welfare functions. (Same course as Economics 200B.)

200C. Microeconomics Theory (Graduate) III. Makowski
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Further topics in microeconomics, including risk and uncertainty, capital theory, separability and aggregation, and other topics. (Same course as Economics 200C.)

200M. Optimization In Economics (5) I. Roemer
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or 100M and 101, or courses 100A, 100B, and Economics 101; Mathematics 21A, 21B, and 21C. Mathematics for economists including linear programming, shadow pricing, linear algebra, convexity and concavity, non-linear programming, Keynesian and/or classical conditions. (Same course as Economics 200M.)

204. Microeconomics Analysis (5) I. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or courses 100A-100B and Mathematics 16A-16B. Linear optimization, open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, and applications. (Same course as Economics 204.)

215A. Economic Development (4) I. Jarvis
Seminar—3 hours; discussion—1 hour. Prerequisite: basic degree in economics. Economic development. Relationship or consent of instructor. Theories of economic development as they relate to developing nations; demographic problems; distribution issues in economic development. (Same course as Economics 215A.)

215B. Macroeconomic Development (4) II. Kanaeda (Economics)
Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A. The macroeconomics of economic development; monetary policy; problems; fiscal problems; international trade; specific country studies. (Same course as Economics 215B.)

215C. Economic Development in Agriculture: Policies and Planning (4) II. Taylor
Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations; its role in economic development; agriculture and national planning; sectoral policies relating to production, land tenure and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Economics 215C.)

215D. Development Programming (4) III. Kanaeda (Economics)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200B, 215A and 215B. Analysis of development programs, economic analysis of policy. Application of macroeconomic models, input-output, Social Account Matrix (SAM) and program-
Agricultural Education

See Agricultural Education; and Agricultural and Home Economics Education

Agricultural Education

(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or community colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and human resources. State and federal requirements for instructors participating in federally funded vocational education programs are also met. The need for scientists, technicians, and creative educators to assist in domestic and international agricultural programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation, and related agricultural industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

Written/Oral Expression .......................... 11-12

English (English 1 or 3 and 102 or 103) ........... 7-8

(Note: the above courses simultaneously satisfy the College requirement in Rhetoric (Rhetoric and Communication 1 or 3) ........... 4)

Preparatory Subject Matter .......................... 50-51

Biological sciences (Biological Sciences

Agricultural Education 139

ming techniques. Analysis and case studies of meth-ods of project evaluation. (Same course as Eco- nomics 216D.)

220. Economics of Consumer Policy (3) III. Hazlett Lecture—3 hours. Prerequisite: one graduate course in econometrics and one course in econometrics or the equivalent. Policy criteria; sources of market failure; consumer policy alternatives; empirical evaluation of selected economic policies.

221. Agricultural Policy in Developed Countries (4) I. McCullar Lecture-discussion—4 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparat- ive advantage, trade, and policy formulation relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

222. International Agricultural Trade and Policy (4) I. Carter Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 204; Economics 106 or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choice in an open economy and multinational policy issues. Offered in even-numbered years.

240A. Econometric Methods (4) II. Burt Lecture—4 hours. Prerequisites: Statistics 133 and a course in linear algebra or the equivalent. Least squares, maximum likelihood, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A.)

240B. Advanced Econometrics: Theory (4) I. Havenner Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Statistics 131A, 131B, 131C recommended. Multiple regression analysis, specification analysis, simultaneous equation models, identification, estimating methods, small sample properties. (Same course as Economics 240B.)

240C. Advanced Econometrics: Applications (4) II. Wegge Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Time series analysis and distributed lags, pooling of time series and cross-section data, Bayesian methods for prediction and policy. (Same course as Economics 240C.)

240D. Topics in Econometrics (4) III. Cameron Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometry, trend analysis, macroeconometrics. May vary from year to year. (Same course as Economics 240D.)


253. Optimization Techniques with Economic Applications (4) II. Caputo Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200M. Optimization techniques and methods including linear and nonlinear programming and dynamic models. Numerical applications to household, farm, general equilibrium and economic growth problems.


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

256. Applied Econometrics (4) II. Green Lecture—3 hours; discussion—1 hour. Application of statistical tools to economic and business analysis.

Emphasis on regression analysis, problems of specification, and model development.

257. Production Planning and Market Analysis (3) III. Alston Lecture—3 hours. Quantitative analysis of production systems by statistical, economic, and engineering methods; sales analysis for the individual firm; problems of investment, location, scale of operations.

258. Applied Consumption Analysis (3) III. Lecture—3 hours. Prerequisite: one graduate course in microeconomic theory. Advanced analysis of individual and aggregate consumption models; empirical determinants of consumer behavior; application of consumption economics to selected issues.

261. Case Problems in Management (3) II. McCorkle Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing, and financing issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculture-oriented firms.

263. Agricultural Firm Analysis (3) III. McCorkle Lecture—1 1/2 hours; discussion—1 hour; summer field trips—one 5-day, and one 5-hour. Prerequisite: graduate standing in Agricultural Economics. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of production, economic theory and measurement to individual firm decisions in an applied setting.

275. Financial Management (3) III. Sosnick Lecture—3 hours. Prerequisite: course 171B or the equivalent. Sources and costs of capital; optimal capital structure; project evaluation; investment policy; risk management; dividend policy; management of working capital; mergers and reorganizations.

276. Institutional and Economic Analysis of Natural Resources (3) III. King Lecture—2 hours; discussion—1 hour. Prerequisite: course 204A or Economics 100. Natural resources are developed and allocated in a manner undergoing 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.


285. Analysis of Research in Natural Resource Economics (3) III. Wian Lecture—3 hours. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria; technology and externalities; public goods, extramarket goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.

290. Introduction to Research in Agricultural Economics (1) I. Johnston 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. H. Carter Seminar—1 hour. Prerequisite: second-year Ph.D. standing. Current research problems and activities; guidance on the selection, design, funding and man-
AGRICULTURAL ENGINEERING

1A, 1B, and 1C ....................... 15
Chemistry (Chemistry 1A-1B, and 8A-8B or 12A-12B) ........................................ 16
Computer science (Agricultural Science and Management 21) ................... 3
Economic principles (Economics 1A or 1B) ......................................................... 15
Genetics (Genetics 10 or 100) ................................................................. 4
Mathematics (Mathematics 16A or 21A) ...................................................... 3-4
Statistics (Agricultural Science and Management 150 or Statistics 13) .... 8

Breadth/General Education ......................................................... 6-24
Satisfaction of General Education requirement ............................................. 6-24

Depth Subject Matter ............................................................. 64-52
Education (Agricultural and Home Economics Education 100 and 300, or Applied Behavioral Sciences 175; and Education 110) .................................................. 8
Animal science (Animal Science 1 if no previous course work in Animal Science; Animal Science 2, 21, and 41; one of the following: Animal Science 15, 49A, 49B, or 49C .................................................. 11-16
Agricultural economics (Agricultural Economics 130 or 140) ..................... 4-5
Plant science (Plant Science 2; Soil Science 10 or 100; one of the following: Environmental Horticulture 10, Vegetable Crops 101, Agronomy 100, Ornamental 101, Viticulture and Enology 106 or 110) .................. 11-13
Agricultural mechanics (Agricultural Practices 49 and 149; Consumer Technology 15 and 16; one of the following: Agricultural Engineering Technology 15; Civil Engineering 10; or Consumer Technology 101) .................................................. 10

Specialization ................................................................. 30-32
To be developed in consultation with faculty advisor.

Unrestricted Electives ............................................................ 19-39

Total Units for the Degree ..................................................... 180


Advising Center for the major is located in 101 AOB 4 (916-752-2244).

Teaching Credential Subject Representative. You may make an appointment with a credential counselor to obtain a statement of the completion requirements for the credential at the Applied Behavioral Sciences departmental office, 106 AOB 4. Since new majors in the College do not offer the minimum preparation necessary for entering the Agriculture Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. 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.


Michael J. Delwiche, Ph.D., Associate Professor
Roger E. Garnett, Ph.D., Professor
D. Ken Grimes, Ph.D., Assistant Professor
John R. Goss, M.S., Professor Emeritus
Mark E. Grimr, Ph.D., Associate Professor
George F. Heilman, M.S., Professor Emeritus
Bruce R. Hartsough, Ph.D., Assistant Professor
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Associate Professor
Robert A. Kmetz, B.S., Professor Emeritus
John M. Knocto, Ph.D., Professor
Coby Lorenzen, Jr., M.S., Professor Emeritus
Kathryn McCarty, Ph.D., Assistant Professor
Michael J. McPherson, Ph.D., Assistant Professor
R. Larry Vernon, Ph.D., Professor
John A. Mies, Ph.D., Professor
Stanley S. Morris, Ph.D., Professor Emeritus
Loren W. Neubauer, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor Emeritus
Raul R. Pedrada, Ph.D., Assistant Professor
James W. Rumssey, M.S., Lecturer
Thomas R. A. Gum, Ph.D., Associate Professor
Paul M. Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Assistant Professor
Henry E. Sturdevant, M.S., Professor
Shrinkasava K. Upadhyaya, Ph.D., Associate Professor
Wesley W. Wallyrand, Ph.D., Associate Professor
Wesley E. Yates, M.S., Professor

Courses. Courses are listed under Agricultural Engineering Technology (below), Consumer Technology, and Engineering: Agricultural.

Agricultural Engineering Technology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Agricultural Engineering.

Major Programs and Graduate Study. For the Bachelor of Science program see the major in Engineering; for graduate study see the Graduate Division section in this catalog.

Courses in Agricultural Engineering Technology

These courses are intended primarily for students not majoring in Engineering. Majors in Engineering should not register in Engineering Agricultural Engineering Technology courses pertaining to the following courses should be directed to the instructor or to the Department Office, 2050 Bailer Hall.

Lower Division Courses

15. Plane Trigonometry (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plane Trigonometry. Not open to students in Engineering. Principles of measurement of horizontal distance, horizontal and vertical angles, elevations and differentials, levels, and field problems with special reference to agricultural, forestry and landscaping applications.

98. Directed Group Study (1-5) II, III, IV. The Staff (Student in charge). Prerequisite: consent of instructor. (Pr/NP grading only.)

99. Special Study for Lower Division Students (1-5) II, III, IV. The Staff (Student in charge). (Pr/NP grading only.)

Upper Division Courses

101AT. Fruit Production Mechanization (1) I, II, III, IV. Autotutorial. Prerequisite: Physics 1A or 5A; course 105 may be taken concurrently. Orchard, vineyard and small fruit production machinery. Functions, capabilities and operating principles. (Pr/NP grading only.)

102AT. Farm Tractors (1) I, II, III, IV. J. Rumssey Autotutorial. Prerequisite: Physics 1A or 5A; course 105 may be taken concurrently. Types of farm tractors, operating principles, power transmission components, power-take-off drives, implement hitches and controls, tractor and drawbar power, operator safety, comfort and convenience. (Pr/NP grading only.)

103. Hydraulic Power and Control (1) II. Studer. Lecture-laboratory—4 hours. Prerequisite: Upper division standing; Physics 5A. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling machines.

104AT. Farm Machinery (1) I, II, III, IV. J. Rumssey Autotutorial. Prerequisite: Physics 1A or 5A; course 105 may be taken concurrently. Performance, operating characteristics, costs, operating principles, components, use, types and sizes of farm equipment for field and row crops. (Pr/NP grading only.)

105. Farm Equipment Management (1) I, II, III, IV. J. Rumssey Lecture-discussion—1 hour. Prerequisite: Agricultural Practices 49, or concurrent enrollment in one of the following: course 131AT, 102AT, 104AT, Agricultural Practices 49; or consent of instructor. Farm machinery performance, scheduling and maintenance as affected by technical features, costs, and operator abilities, as well as by crop, soil and weather characteristics. Discussion of technical information from accompanying autotutorial or practice courses to management principles.

110L. Experiments in Food Engineering (1) II. Singh Laboratory—3 hours. Prerequisite: Food Science and Technology 1108 (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer coefficients; heat exchangers; transient energy transfer in foods; refrigeration, freezing, concentration and dehydration of foods. (Pr/NP grading only.)

113. Animal Environment and Shelters (1) I. Studer Lecture—2 hours (first five weeks of quarter). Prerequisite: Plant Science 2 or Biological Sciences 1. Study of the animal environment and the environment necessary for animal growth and survival. (Pr/NP grading only.)

114. Greenhouse Environment and Equipment (1) I. Studer Lecture—2 hours (last five weeks of quarter). Prerequisite: Plant Science 2 or Biological Sciences 1. Study of the environment necessary for animal growth and survival. (Pr/NP grading only.)

134. Pesticide Application Techniques (3) I. Giles Lecture—1 hour, prerequisite: upper division standing; Chemistry 15; introductory course in environmental toxicology. Prerequisite: Plant Science 1A or 5A; introductory course in entomology, botany, plant pathology or nematode recommended. Emphasis will be on safe application of pesticides. Requirements of closed mixing and handling systems to protect workers. Disposal of pesticide materials. Selection and operation of ground and aerial spray application systems. Techniques to minimize spray drift hazards.

141. Technology for Agriculture in Developing Regions (3) I. Chancellor Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A or 5A; 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 International Agricultural Development 141.)

141AT. Equipment Technology for Developing Agriculture (1) I, II. Chancellor Autotutorial—1 hour. Prerequisite: course 141 or International Agricultural Development 141 (may be

NOTE: For key to footnote symbols, see page 133.
Agricultural Science and Management

Agricultural Practices

(College of Agricultural and Environmental Sciences)

Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the instructor or to the Office of the Department of Agricultural Engineering, 2030 Baner Hall.

Lower Division Course

48. Field Equipment Operation (2) I, II, J. Rumsey

Lecture—1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of soil, cultivation, tilling, and planting equipment. Typical cultural practices sequences. (P/NP grading only.)

Upper Division Course

148. Field Equipment Maintenance (2) I, II, J. Rumsey

Lecture—1 hour; laboratory—3 hours. Prerequisite: Consumer Technology 16 and 101 or consent of instructor. Trouble shooting and major repair of farm equipment. Intermediate welding to include hard-facing and inert gas welding. Class projects on maintenance, repair and fabrication. (P/NP grading only.)

Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Science and Management major is designed to prepare students for career opportunities in agriculture, veterinary medicine, and allied fields, as well as in forestry, wildlife management, and environmental science. The program provides a core of science and technology necessary for the understanding of how agriculture and food systems work, along with basic elements of economics, business, and management. Students may select from among several options allowing concentration of their agricultural science and technology courses in a chosen field. Experience in computing sciences serves as an appropriate complement to this major.

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal courses are acceptable; and a more comprehensive course treatment (e.g., Physics 1A and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unrestricted elective units to go beyond the minimum requirements shown for the preparatory and depth subject matter areas.

UNITS

Written/Oral Expression 7-8

Preparatory Subject Matter 59

Accounting (Economics 11A, 11B) 8

Biosocial sciences (Biological Sciences 1A, 1B, 1C) 16

Chemistry (Chemistry 1A, 1B, 4A, 4B) 16

Economic principles (Economics 1A, 1B) 10

Mathematics (Mathematics 18A-18B or the equivalent) 6

Statistics (Agricultural Science and Management 150) 4

Breadth Subject Matter 5-24

Satisfaction of General Education requirements 2-24

NOTE: For key to footnote symbols, see page 133.
Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

Lower Division Course

21. Applications of Microcomputers for Agriculture (3) Ill. 1. Plant (Agronomy and Range Science); Ill. 2. Animal (Agronomy and Range Science); Ill. 3. Williams (Agronomy and Range Science)

Lecture—2 hours; laboratory-discussion—2 hours.

Prerequisite: high school algebra. Concepts of computing in an agricultural context; applications of microcomputers using BASIC, spreadsheets, databases, management, word processing and communications.

Upper Division Courses

121. Analysis and Simulation of Agricultural Systems (4) Ill. 1. Plant

Lecture—3 hours; discussion—laboratory—1 hour.

Prerequisite: course 21 or the equivalent experience with computers. The process of systems analysis, dynamic simulation of crops and biological populations, constructions and use of simulation models for agricultural systems, and an introduction to expert systems and their applications in agriculture.

150. Applied Statistics in Agricultural Sciences (4) I. Jeron (Agronomy and Range Science)

Lecture—3 hours; discussion-laboratory—2 hours.

Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretations.

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.

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 Division section in this catalog.

Graduate Adviser. R.L. Travis.

Related Courses. See Plant Science and Range Science.

Courses in Agronomy

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) I, II, III, summer.

The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learning experience on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/N grading only)

Upper Division Courses

100. Principles of Agronomy (4) Ill. Travis

Lecture—3 hours; discussion—demonstration—1 hour.

Prerequisite: a course in general botany and/or Plant Science 2 or consent of instructor. Fundamentals of field crop production and agronomic problem solving using ecological, physiological, and genetic principles.

200. Principles of Agronomy Laboratory (1) Ill. Travis

Laboratory—3 hours. Prerequisite: course 100 (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production.

110. Perspectives in Biotechnology (3) Ill. Valentine

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.

111. Cereal Crops of the World (4) Ill. Quaint

Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Contribution of cereal crops to man's development; adaptation, production, utilization, and factors determining quality of grains, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

112. Forage Crop Ecology (3) Ill. Raguse

Lecture—3 hours. Prerequisite: Biological Sciences 1C or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Offered in odd-numbered years.

113. Fiber, Oil and Sugar Crops in a Changing World (4) Ill. Power

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100; 100L; Biological Sciences 1C. Industrial crops as world resources of foodstuff, fiber, oil, and consumer goods. The relationship of crops to their plant and animal components. Technological changes, socioeconomic and political forces that shape crop production, and utilization practices. Offered in odd-numbered years.

120. Morphology and Reproduction of Agronomic Crops (3) Ill. Webster

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Study of growth and development of crop plants with emphasis on reproductive structure and pollination. Techniques for morphological analysis of crop plant growth. Offered in odd-numbered years.

192. Internship (1-12) I, II, III, summer.

The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/N grading only)

197. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge)

Tutoring—1-5 hours. Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduates who desire teaching experience. Student will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/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: 6 upper division units of agronomy. (P/N grading only)

Graduate Courses

205A. Design, Analysis and Interpretation (3) II. Plant

Lecture—3 hours. Prerequisite: Agricultural Science and Management 150. Planning and analysis of field and laboratory experiments with emphasis on concept and techniques of designing experiments. Randomized block, factorial, incomplete block and response surface designs discussed together with appropriate methods of data analysis and interpretation.

205B. Design, Analysis and Interpretation II. Williams

Lecture—3 hours. 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) I. Rice, Jair

Lecture—2 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 students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in odd-numbered years. (Same course as Ecology 207)

211. Advanced Plant Breeding (4) Ill. Teuber

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205A; Genetics 105; Plant Science 113. Philosophical, methods, and problems in developing improved plant species. Topics include: breeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data.

212. Qualitative Genetics and Plant Improvement (4) II. The Staff

Lecture—4 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. Genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

223. Selection Theory in Plant Breeding (3) II. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructors. 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 odd-numbered years.

224. Chromosome Evolution (3) I. Dvorak

Lecture—3 hours. Prerequisite: Genetics 100 or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in odd-numbered years.

225. Advanced Topics in the Physiology of Crop and Range Plants (3) III. Huffaker

Lecture—3 hours. Prerequisite: Botany 112 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crops and range plants in relation to nutrition 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; emphasis on increasing agronomic productivity. Offered odd-numbered years.

234. Physiology of Crop Growth and Development (3) I. Jersildt

Lecture—3 hours. Prerequisite: Botany 111, 112 or the equivalent. Selected aspects of plant growth and development as they relate to crop productivity. Analysis of current literature on shoot and root growth and function, responses to environment and hormonal and environmental controls of development. Offered in odd-numbered years.

236. Seminar in Crop Growth, Production and Utilization (1-2) I. Hilt, II. Loomis

Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food,
Agronomy and Range Science

(College of Agricultural and Environmental Sciences)
Donald N. Nielsen, Ph.D., Chairperson of the Department

Department Office, 133 Hunt Hall (916-752-1703)

Faculty
Robert W. Allard, Ph.D., Professor Emeritus (Agronomy and Range Science, Genetics)
R. William Breidenbach, Ph.D., Lecturer
Ivan W. Buddenhagen, Ph.D., Professor
Kenneth G. Cassman, Ph.D., Assistant Professor
Beecher Crompton, M.S., Professor Emeritus
Montague W. Derrment, Ph.D., Assistant Professor
Jan Dvorak, Ph.D., Professor
Shu Dong, Ph.D., Professor
Melvin R. George, Ph.D., Lecturer
Paul L. Gepts, Ph.D., Assistant Professor
James E. Hill, Ph.D., Lecturer
Ray C. Huisken, Ph.D., Professor
Leland F. Jackson, Ph.D., Lecturer
Subho K. Jain, Ph.D., Professor
Judith A. Jernstedt, Ph.D., Assistant Professor
Milton B. Jones, Ph.D., Lecturer
Thomas A. Kettlum, Ph.D., Lecturer
Horton M. Laude, Ph.D., Professor Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Loomis, Ph.D., Professor
R. Horton Love, Ph.D., Professor Emeritus
John W. Menke, Ph.D., Professor
Duane S. Mikkelsen, Ph.D., Professor Emeritus
Donald R. Nielsen, Ph.D., Professor Emeritus (Landscape, Agronomy, and Water Resources)
Maurice L. Peterson, Ph.D., Professor Emeritus
Donald A. Phillips, Ph.D., Professor
Richard E. Plant, Ph.D., Professor
Y. P. Puri, Ph.D., Lecturer
Calvin O. Quistlet, Ph.D., Professor
Charles A. Ragsdale, Ph.D., Professor
D. William Rehm, Ph.D., Professor
Kevin J. Rice, Ph.D., Assistant Professor
Charles W. Schaller, Ph.D., Professor Emeritus
Steven R. Temple, Ph.D., Lecturer
Larry R. Teuber, Ph.D., Associate Professor Emeritus
Robert L. Travis, Ph.D., Professor
Raymond C. Valentine, Ph.D., Professor
Barbara D. Webster, Ph.D., Professor
Theresa L. Voss, Ph.D., Associate Professor
William A. Williams, Ph.D., Professor
Frederick P. Zschelie, Jr., Ph.D., Professor Emeritus

Courses. See the Agronomy, and the Range Science course listings.

American Studies

(Classes of Letters and Science)
David Scott Wilson, Ph.D., Program Director
Program Office, 816 Sprout Hall (916-752-3377)

Committee in Charge
Vincent A. Crookshank, Ph.D., (Education)
Lyn Lofland, Ph.D., (Sociology)
Jay Meichling, Ph.D., (American Studies)
Michael Smith, Ph.D., (History)
Patricia Turner, Ph.D., (American Studies, American Literature)
David Van Leer, Ph.D., (English)
Clarence E. Walker, Ph.D., (History)
Deborah Weiner, Ph.D., (Art History)
David Scott Wilson, Ph.D., (American Studies)

Faculty
Jay Meichling, Ph.D., Professor
Patricia Turner, Ph.D., Assistant Professor
David Scott Wilson, Ph.D., Associate Professor

The Major Program
American Studies offers students who feel too limited by departmental approaches a chance to experience an alternative, interdisciplinary path of study. The program introduces lower division students to the ways in which culture, politics, and social experience are intertwined. American Studies courses also pay attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and social preference unevenly affect Americans' lives. American Studies majors receive advanced instruction and practice in America's past through the close study of American culture and the lives of American people. The program provides comprehensive study of the diversity of American culture, including its social, political, and economic contexts. American Studies courses are taught by a diverse group of faculty members who bring different perspectives to the study of American culture.

Career Alternatives. As an interdisciplinary program, American Studies provides a liberal arts and sciences undergraduate education. American Studies majors are encouraged to take courses in a variety of subject matter and pursue careers in a variety of fields. The program is designed to provide a strong foundation in the humanities and social sciences, preparing students for a wide range of careers. American Studies majors have pursued careers in the arts, humanities, social sciences, and public service.

A.B. Major Requirements:

Preparatory Subject Matter

One course from American Studies 1 series
American Studies 45
Two courses chosen from History 17A, 17B, 75, 75B
One course chosen from English 30A, 30B
One course chosen from Anthropology 2, Sociology 2

Depth Subject Matter

American Studies core courses
American Studies 110, 120, and 130

American Cultural Themes
Choose any two courses from the 150

NOTE: For key to footnote symbols, see page 133.

American Studies

(Classes of Letters and Science)
David Scott Wilson, Ph.D., Program Director
Program Office, 816 Sprout Hall (916-752-3377)

Committee in Charge
Vincent A. Crookshank, Ph.D., (Education)
Lyn Lofland, Ph.D., (Sociology)
Jay Meichling, Ph.D., (American Studies)
Michael Smith, Ph.D., (History)
Patricia Turner, Ph.D., (American Studies, American Literature)
David Van Leer, Ph.D., (English)
Clarence E. Walker, Ph.D., (History)
Deborah Weiner, Ph.D., (Art History)
David Scott Wilson, Ph.D., (American Studies)

Faculty
Jay Meichling, Ph.D., Professor
Patricia Turner, Ph.D., Assistant Professor
David Scott Wilson, Ph.D., Associate Professor

The Major Program
American Studies offers students who feel too limited by departmental approaches a chance to experience an alternative, interdisciplinary path of study. The program introduces lower division students to the ways in which culture, politics, and social experience are intertwined. American Studies courses also pay attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and social preference unevenly affect Americans' lives. American Studies majors receive advanced instruction and practice in America's past through the close study of American culture and the lives of American people. The program provides comprehensive study of the diversity of American culture, including its social, political, and economic contexts. American Studies courses are taught by a diverse group of faculty members who bring different perspectives to the study of American culture.

Career Alternatives. As an interdisciplinary program, American Studies provides a liberal arts and sciences undergraduate education. American Studies majors are encouraged to take courses in a variety of subject matter and pursue careers in a variety of fields. The program is designed to provide a strong foundation in the humanities and social sciences, preparing students for a wide range of careers. American Studies majors have pursued careers in the arts, humanities, social sciences, and public service.

A.B. Major Requirements:

Preparatory Subject Matter

One course from American Studies 1 series
American Studies 45
Two courses chosen from History 17A, 17B, 75, 75B
One course chosen from English 30A, 30B
One course chosen from Anthropology 2, Sociology 2

Depth Subject Matter

American Studies core courses
American Studies 110, 120, and 130

American Cultural Themes
Choose any two courses from the 150

NOTE: For key to footnote symbols, see page 133.
common sense, science, literature; special attention to the grounding of wisdom in circumstance of race, gender, generation, ethnic identity, and region. (P/NP grading only.)

10. American Civilization (4) I. Melling, Wilson Lecture—2 hours; discussion—2 hours. Intended for student not specializing in American Studies. Interpretation of American society and culture from a variety of perspectives. Examples from American landscape, building, ritual, literature, art, and music, and political and social developments.

45. Introduction to American Studies (4) I, II. Wilson, Melling, and staff Lecture—2 hours; discussion—1 hour. Prerequisite: any course from the course sequence (I, II). Popular Culture and Society. Introduction to interdisciplinary approaches to American studies; close reading of representative American Studies texts from 1930s to present; special attention to the ways American Studies scholars have dealt with gender, social class, race, ethnicity, region, and age. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.

98. Directed Group Study (1-5) I, II. 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. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

101A-H. Special Topics (4) I, II, III. The Staff (Chairperson in charge) Seminar—2 hours; intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. Content will vary according to the instructor and in accord with the following titles: (A) Popular Culture Studies; (B) Women's Studies; (C) Material Aspects of American Culture; (D) American National Character; (E) American Literature; (F) The Interrelations Between Arts and Ideas; (G) New Directions in American Culture Studies; (H) Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area only.

110. A Decade in American Civilization (4) II. The Staff Lecture—2 hours; discussion—2 hours. Close examination of a single decade in American civilization; this decade will be chosen from the history, literature, art, customs, and ideas of Americans living in the decade.

120. American Folklore and Folk Life (4) III. The Staff Lecture—3 hours; fieldwork—1 hour. Theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture; the uses and meanings of those traditions in various folk communities, including families, ethnic institutions, voluntary organizations, and occupational groups. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2.

125. Corporate Cultures (4) III. Hagerty Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: one course chosen from course 30, 120, Anthropology 2, Psychology 16, or Sociology 12; or consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of culture on diversity among corporate cultures, both within and in contact with foreign corporations.


151. American Landscapes and Places (4) III. Wilson Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1 or 45. Comparative study of several American cultural populations inhabiting a region, including their relationship to shared physical, political, and social environment, their cultural relationships, and their relationships to the dominant American popular and elite culture and folk traditions.

152. The Lives of Children in America (4) III. Melling Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches.

153. The Individual and Community in America (4) III. The Staff Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought.

180. Junior Proseminar (2) II, III. Melling, Wilson Discussion—2 hours. Prerequisite: junior standing in American Studies major. A small group, intensive study of works frequently cited in American Studies scholarship; emphasis on theory and its application to American materials. May be repeated for credit with consent of instructor.

180A-190B. Senior Thesis (4-4) I, II, III. Melling, Wilson Seminar—2 hours; independent study—2 hours. Prerequisite: senior standing in American Studies major. In consultation with advisor, student will conduct a written research paper on a topic mutually agreed upon and enunciated in a prospectus reviewed and accepted by faculty. (Deferred grading only, pending completion of sequence.)

192. Internship in American Institutions (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of internship positions, with priority to American Studies majors and those completing course 30. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographic data. May be repeated for credit for a total of 12 units. (P/NP grading only.)

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

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (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.)

NOTE: For key to footnote symbols, see page 133.
structural basis of function, unique aspects of each specific species and on preparing graduate students for teaching.

201D. Advanced Anatomy of the Thorax (1.5) III. Popper
Lecture—4 hours total; discussion—5 two-hour sessions; laboratory—6 three-hour sessions. Prerequisites: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the thorax, its contents and the dog and other domestic species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

201E. Advanced Anatomy of the Abdomen (2) III. Tyler
Lecture—6 hours total; discussion—7 two-hour sessions; laboratory—7 three-hour sessions. Prerequisites: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the contents of the abdomen comparing the dog to other domesticated species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

201F. Advanced Anatomy of the Pelvis (3) III. Faulkin
Lecture—10 hours total; discussion—11 two-hour sessions; laboratory—9 three-hour sessions. Prerequisites: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the contents of the pelvis of the dog with comparison to other domesticated species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching. (Deferred grading only, pending completion of two-quarter sequence.)

202. Organology (2) II. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in even-numbered years.

205. Ultramicroscopic Anatomy (3) I. The Staff (Tyler 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 even-numbered years.

207. Perspectives in Morphological Research (3) III. The Staff (Wu, Tablin in charge)
Lecture—2 hours; discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examples of specific methods include stereology, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injections. Offered in odd-numbered years.

215. Veterinary Histology (6) II. The Staff (Faulkin in charge)
Lecture—3 hours; laboratory—9 hours. Prerequisite: Biological Sciences 1BC. The microscopic anatomy of tissues and organs of mammalian and avian species of veterinary significance.

221. Neurosciences of Domestic Animals (5) II. The Staff
Lecture—33 hours total; discussion—6 two-hour sessions; laboratory—9 three-hour sessions. Prerequisites: graduate standing and consent of instructor. Integrated study of the central nervous system including gross and microscopic anatomy, neurophysiology and neurological examination of domestic animals.

283. Tumor Biology (3) I. The Staff (Faulkin 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 odd-numbered years.

290. Seminar (1) I. The Staff
Seminar—1 hour. (SU grading only)

291. Topics in Biology of Respiratory System (1) I, II. III. Tyler, Hyde, Popper, St. George, Wu, Pinkerton Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (SU grading only)

297. Advanced Group Study in Surgical Anatomy (2-4) I, II. III. The Staff (Chairperson in charge)
Laboratory—6-12 hours. Prerequisite: Veterinary Medicine 407C or consent of instructor. Selected topics in topographical, radiological, or regional anatomy as they apply to the clinical sciences.

298. Group Study (1-5) I, II. III. The Staff (Chairperson in charge)
Laboratory—6-15 hours. Prerequisite: consent of instructor.

299. Research (1-12) I, II. III. The Staff (Chairperson in charge)
Laboratory—6-36 hours. Prerequisite: consent of instructor. (SU grading only)

Anesthesia
See Medicine, School of

Animal Behavior (A Graduate Group)
Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group
Group Office, 148 Young Hall (Psychology) (916-752-1880/1855)
Faculty. The Group includes faculty from eleven departments in three schools and colleges.
Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students will develop expertise in the areas of specialization: (1) ethology and evolutionary bases of animal behavior, (2) physiological basis of animal behavior, and (3) behavior of domestic animals. All three specializations emphasize the adaptive and evolutionary bases of animal behavior. Resources available to students, in addition to various departmental facilities, include those of the California Primate Research Center and the Agricultural Field Stations. There is an early application deadline of February 15 for fall quarter.
Preparation. Appropriate preparation is a bachelor's or master's degree in one of the several disciplines relevant to behavior such as psychology, zoology, entomology, anthropology, physiology, wildlife biology, ecology, animal science, veterinary science, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program.
General genetics: Genetics 100 or the equivalent
Statistics: Statistics 102 or Psychology 103, or the equivalent
Evolution: Genetics 103 or Zoology 148, or the equivalent
Animal behavior: Psychology 150, Wildlife and Fisheries Biology 140, or Zoology 155, or the equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This pre-dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.
Breadth Requirement. The following core courses or the equivalent (22 to 24 units) are required of all students.
Systems: Physiology: Physiology 110 or Zoology 142
Statistical analysis: one course from Psychology 206, 207, Statistics 106, or 110
Scientific approaches to animal behavior research:
Animal Behavior 201 Seminar in animal behavior: Animal Behavior 290 Ecology: Entomology 104, Environmental Studies 100, or Zoology 125
College teaching: Biological Sciences 310 or Psychology 300
Comparative psychology: Psychology 250
Specialization. In addition to the requirements listed above, students must also take courses in one of the three areas of specialization with substitution as approved by the advisor.

Courses in Animal Behavior
Graduate Courses
201. Scientific Approaches to Animal Behavior Research (3) I. Rich (Wildlife and Fisheries Biology)
Lecture—3 hours. Prerequisite: consent of instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit when topics differ.

220. Behavioral Aspects of Animal Domestication (3) III. Price (Animal Science)
Lecture—3 hours. Prerequisite: graduate standing and a course in animal behavior, or consent of instructor. History of animal domestication, the role of natural and artificial selection in domestication, the influence of environment and experience on domestic animal behavior and human-animal interactions. Offered in even-numbered years.

290. Seminar in Animal Behavior (1-3) III. Owings (Psychology)
Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (SU grading only)

298. Group Study (1-5) I, II. III. The Staff
Preparation: graduate standing and consent of instructor.

299. Research (1-12) I, II. III. The Staff
Preparation: graduate standing and consent of instructor. (SU grading only)

Animal Biochemistry
See Biochemistry, and Biochemistry and Biophysics.

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
Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 1149 Meyer Hall.

NOTE: For key to footnote symbols, see page 133.
298. Group Study (1-5) I, II, III. The Staff (Bradford in charge).
Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (SU grading only.)

(SU grading only.)

Animal Nutrition

See Nutrition

Animal Physiology

(College of Agricultural and Environmental Sciences)
Verne E. Mendel, Ph.D., Chairperson of the Department
Department Office, 196 Briggs Hall (916-752-0233)

Faculty
Marylyn S. Barkley, Ph.D., Associate Professor
James M. Boda, Ph.D., Professor Emeritus
Earl E. Carpenter, Ph.D., Professor Emeritus
Harry W. Colvin, Jr., Ph.D., Professor Emeritus
Ferry T. Cupp, Ph.D., Professor Emeritus (Animal Science)
Charles A. Fuller, Ph.D., Associate Professor
Jack M. Goldberg, Ph.D., Associate Professor
John M. Horwitz, Jr., Ph.D., Professor
Barbara A. Horwitz, Ph.D., Professor
Andrew T. Ishida, Ph.D., Assistant Professor
Frederick W. Lorenz, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor (Animal Physiology, Animal Science)
Gary P. Moborg, Ph.D., Professor (Animal Science)
Frank X. Ogasaawa, Ph.D., Professor Emeritus (Avian Sciences)
Pamela A. Poppe, Ph.D., Associate Professor
Edward A. Rhode, Ph.D., Professor
Grace L. Rosenequist, Ph.D., Assistant Adjunct Professor
Robert P. Scolby, Ph.D., Professor (Neurology)
Arnold J. Steins, Ph.D., Professor Emeritus
Arthur H. Smith, Ph.D., Professor Emeritus
W. Jeffrey Weidner, Ph.D., Professor
Charles M. Winget, Ph.D., Lecturer
Dorothy E. Wolfe, Ph.D., Lecturer

Courses. See the course listings under Physiology (Animal).

Animal Science

(College of Agricultural and Environmental Sciences)
———, Ph.D., Chairperson of the Department
Department Office, 2253 Meyer Hall (916-752-1250)

Faculty
Thomas E. Adeyemo, Ph.D., Associate Professor
Gary B. Anderson, Ph.D., Professor
C. Robert Ashmore, Ph.D., Professor
R. Leland Baldwin, Jr., Ph.D., Professor
Patricia J. Berg, Ph.D., Associate Professor
G. Eric Bradford, Ph.D., Professor
Dan L. Brown, Ph.D., Assistant Professor
C. Christopher Calvert, Ph.D., Associate Professor
Floyd D. Carroll, Ph.D., Professor Emeritus
Ernest S. Clanton, Ph.D., Professor Emeritus
Walters H. Clark, Jr., Ph.D., Professor Emeritus
Douglas E. Conklin, Ph.D., Lecturer
Fred S. Conley, Ph.D., Lecturer
Ferry T. Cupp, Ph.D., Professor Emeritus
Edward J. DePeters, Ph.D., Associate Professor
Sergei Doroshov, Ph.D., Professor Emeritus
James G. Fadel, Ph.D., Assistant Professor
Thomas R. Fumula, Ph.D., Associate Professor
Graham A. E. Gall, Ph.D., Professor
William N. Garrett, Ph.D., Professor Emeritus
Dennis Hedgcock, Ph.D., Lecturer
Hubert Helm, Jr., Ph.D., Professor Emeritus
J.U. Hull, M.S., Lecturer
S. Kim, Ph.D., Associate Professor
Robert C. Labin, Ph.D., Professor Emeritus
Yu-Bang Lee, Ph.D., Professor
Glen P. Loge, Ph.D., Professor Emeritus
Joan M. MacCary, Ph.D., Professor
Juan F. Medina, Ph.D., Assistant Professor
Verne E. Mendel, Ph.D., Professor (Animal Science, Animal Physiology)
James H. Meyer, Ph.D., Professor Emeritus
Gary P. Moborg, Ph.D., Professor
James D. Murray, Ph.D., Associate Professor
Anita M. Oberbauer, Ph.D., Assistant Professor
Edward O. Price, Ph.D., Professor
Wayne C. Rolf, Ph.D., Professor Emeritus
Janet F. Roser, Ph.D., Assistant Professor
Robert W. Touchberry, Ph.D., Professor
William C. Weir, Ph.D., Professor Emeritus (Animal Science, Nutrition)
Richard A. Zinn, Ph.D., Associate Professor

The Major Program

The objective of the Animal Science major is to develop an understanding of the proper care of animals and their utilization by man for food, fiber, work, research, companionship, and recreation. The study of animals is achieved through biological, physical, and social sciences such as chemistry, biochemistry, genetics, physiology, nutrition, economics, mathematics, and their integration in the various animal science courses.

Career opportunities for graduates cover a wide range from farming and ranching through all of the industries, institutions, and professions that serve domestic animal agriculture, and aquaculture directly or indirectly. These include positions in management, sales, financial services, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research. Preparation for veterinary medicine or other professional schools or graduate study may be achieved by careful planning in the major.

Both agriculture and domestic animal agriculture are included in Animal Science. Students specializing in aquaculture are advised by faculty members from this area of study.

An Animal Science option is available in the Agricultural Science and Management major. This option places greater emphasis on economics, business, and management than the Animal Science major.

B.S. Major Requirements:

UNITS
Written/Oral Expression.................................7-8
See College requirement.................................7-8
Preparatory Subject Matter...............................56
Animal science (Animal Science 1, 2, 41, and 41L)..................12
Biological sciences (Biological Sciences 1A, 1B, 1C)..................15
Chemistry (Chemistry 1A, 1B, 8A, 8B)......................16
Computer science (Agricultural Science and Management)........3
Statistics (Statistics 102 or Agricultural Science and Management 150)...........3
Breadth/General Education......................................6-24
Satisfaction of General Education requirement......................6-24
21. Livestock and Dairy Cattle Judging (2) Ill. Van Liew
Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, and carcase quality, and form and milk production.

22A-22B. Animal Judging (2:2) Ill. Van Liew
Laboratory—6 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. (P.N.P. grading only)

41. Domestic Production (2) I. DePeters Lecture—2 hours. Prerequisites: courses 1 and 2. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, general husbandry and marketing.

41L. Domestic Animal Production Laboratory (2) I, II. DePeters in charge (Van Liew Laboratory—6 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P.N.P. grading only)

49A-49B. Animal Management Practices (2-2)
Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the arts and science of management of beef and dairy cattle, dairy goats, horses, sheep, swine, and laboratory animals. (P.N.P. grading only)

92. Internship in Animal Science (1-12) I, II, III. The Staff (Department Chairperson in charge)
Laboratory—3-18 hours. Prerequisite: consent of instructor. Work-experience off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Application Request form (P.N.P. grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P.N.P. grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P.N.P. grading only)

Upper Division Courses

104. Principles of Domestic Animal Behavior (3) I. Price
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. (Students who have received credit for Zoology 155 may receive only 2 units for this course.)

105. Behavioral Adaptations of Domestic Animals (2) II. Price
Lecture—2 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—6 hours. Prerequisite: course 104 or the equivalent. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results.

113. Principles of Swine Production (4) I. Berger, Calvert, Parker
Lecture—3 hours; laboratory—3 hours. One Saturday field trip. Prerequisite: Biological Sciences 101B, Physiology 110, Genetics 100. Production of the various classes of swine as related to breeding, nutrition, metabolism, and reproduction.

NOTE: For key to footnote symbols, see page 133.
131. Reproduction and Early Development in Aquatic Animals (4) II. Doroshov
Lecture—3 hours. Prerequisite: Zoology 100; Wildlife and Fisheries Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, nursing efficiency, and fertility of animals commonly used in aquaculture.

133. Meat and Meat Animal Evaluation (3) I. Lee
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 21 recommended. Correlation of live animal performance and degree of finish with carcass traits, transformation of live animal to carcass, criteria for evaluation and grading of carcasses as related to meat palatability, ante- and post-mortem handling as related to meat quality.

135. Experimental Biochemistry Laboratory (4) I. Ashmore
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, use of commonly used laboratory analytical methods, cost analysis, literature review and publication writing are provided. (Not open to students who have received credit for Biochemistry 181.)

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.

150. Range Livestock Production (3) III. Morris, Raguie (Agronomy and Range Science)
Lecture—3 hours. Prerequisite: course 2, Range Science 133. Application of principles of animal and range science to the extensive production of livestock and related products from range. Emphasis on beef and sheep production systems from perennial and annual range types. (Same course as Range Science 163.)

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 progress and techniques of animal sciences. May be repeated for credit. (P/NP grading only)

192. Internship in Animal Science (1-12) I, II, III. The Staff (Chairperson in charge)
Lecture—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off and on campus in dairy, livestock and agri-cultural 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)

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)

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Graduate Courses

206. Models in Agriculture and Nutrition (3) I. Fidel
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 168; Statistics 168. Basic model building principles and use of statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition. Offered in odd-numbered years.

215. Advanced Concepts of Growth Regulation (3) I. Oberbauer
Lecture—3 hours. Prerequisite: Biochemistry 101B; 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 optional research proposal.

216. Grant Writing Techniques (1) I. Oberbauer
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 revised. (SU grading only)

235. Advanced Techniques in Animal Nutrition Research (2) I, II, III. The Staff (Calvert in charge)
Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of advanced laboratory techniques to animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (SU grading only)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (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. An evaluation letter sent to the student's advisor with a copy to the student. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Sent. 1, 2, 3—letter grading; from Sent. 4 on—SU grading only)

298C. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

The Major Program

Anthropology is a diverse field with many subdisciplines, subdivided at Davis into four categories—biological, sociocultural, linguistic, and archaeology. The student who majors in anthropology learns about the social, biological, and cultural dimensions of human social life—past and present—and gains a broad understanding of human society that is unparalleled in other disciplines. The anthropology student learns to evaluate evidence, think critically and write clearly, and, following graduation, may wish to pursue graduate studies in anthropology or in a related field such as social welfare, museum work, education, law, or international development. Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to Homo sapiens should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas, or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistoric and the techniques and methods of archaeology) should consult an adviser before choosing one degree program or the other.

A.B. Major Requirements:

Preparatory Subject Matter: 24-39

Anthropology 1, 2, 3, 4, 5, 6... 16
Statistics 13...

Geography 1 or Environmental Studies 30...
Foreign language (15 units or the equivalent in one language). 0-15

Depth Subject Matter: 40

Linguistic anthropology, one course...
Biological anthropology, one course...
Ethnography, one course...
Archaeology, one additional course...
An additional 8 units selected from the following: upper division anthropology courses, Art 150, 151, Genetics 100...

Total Units for the Major: 84-79

B.S. Major Requirements:

Preparatory Subject Matter: 45-56

Anthropology 1, 2, 3, 4, 5, 6... 16
Biological Sciences 1A, 1B...
Chemistry 1A, 1B...
Statistics 13, 32, or 102...
Chemistry 8A-8B or Mathematics 16A-16B...
Foreign language (10 units or the equivalent in one language) 0-10

NOTES: For key to footnote symbols, see page 133.
Courses in Anthropology

Lower Division Courses

1. Human Evolutionary Biology (4) I. McHenry, II. D.G. Smith, III. P.S. Rodman
   Lecture—3 hours; discussion—1 hour. Introduction to human evolution. Processes and course of human evolution; man’s place in nature and the study of primates; the biological variability of living man and the genetic background. General Education credit: Nature and Environment/Introductory (CAN Anth 2).

2. Cultural Anthropology (4) I. Davis, II. Lavue; III. Curley
   Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. General Education credit: Contemporary Societies/Introductory (CAN Anth 4).

3. Introduction to Archaeology (4) I. True
   Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. (CAN Anth 6).

4. Introduction to Anthropological Linguistics (4) I. Wall
   Lecture—3 hours; discussion—1 hour. Exploration of the role of language in social interaction and world view; minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of the relationship of language to sociocultural issues. General Education credit: Contemporary Societies/Introductory.

5. Proseminar in Biological Anthropology (4) III.
   The Staff
   Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment.

15. Behavioral and Evolutionary Biology of the Human Life Cycle (5) I. Chisolm; III. Rodman, III. Borgerhoff, Muler
   Lecture—2 hours; discussion—1 hour. Prerequisite: course 4, 5. Introduction to the biology of birth, childhood, marriage, the family, age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Anthropology 1, or Genetics 10.

23. Introduction to World Prehistory (4) III. Beaton
   Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Anthropology 3.

25. Cross-Cultural Communication (4) III. Wall
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Description and analysis of communicative behavior in multi-ethnic societies. Analysis and cross-cultural comparison of linguistic and non-linguistic communication in face-to-face interaction. Language as a sociocultural resource. Conversation and more formal speech genres. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 4; or Anthropology 2 and Linguistics 1.

NOTE: For key to footnote symbols, see page 133.
120. Language and Culture (4) II. Welf Lecture—3 hours; discussion—1 hour. Prerequisite: course 4; or course 2 and Linguistics 1. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective.

(b) Social-Cultural Anthropology

121. Folklore (4) III. Crowley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

122. Economic Anthropology (4) II. Davis Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural settings and its modern changes.

123. Anthropology and Political Economy (4) II. Walton Lecture—3 hours; discussion-laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; the interrelationships among political institutions, economic infrastructures and cultural complexity.


125. Structuralism and Symbolism (4) II. Yoyngam Lecture—3 hours; discussion-laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Course focuses on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences.

126. Anthropology of Development (4) I. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation. Application of anthropological theory to case studies of rural economies and economic systems.

127. Urban Anthropology (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological theories of urban political structures, organization of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies.

128. Kinship and Social Organization (4) III. Davis Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of kinship and family systems.

129. Psychological Anthropology (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Comparative exploration of the "individual" in foraging, horticultural, pastoral, agricultural, and industrial societies. Impact of class and state formation, gender, ethnicity, poverty, ruralization, urbanization, economic and political change on the "individual." (Former course 119.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Psychology 15-16, Sociology 2.


131. Women and Development (4) II. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Women and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development.

132. Festivals and Carnival (4) II. Crowley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic and folkloric analysis of selected festivals based on ethnic, religious, regional, class, vocational, and other affiliations.

133. Cultural Ecology (4) III. Orlove Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments like the United States (Former course as Environmental Studies 133.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

134. Race and Sex: Race Mixture and Mixed Populations (4) I. Ford Lecture—3 hours; discussion—1 hour. Phenomena of race mixture (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. (Former course 104.)

135. Peasant Society and Culture (4) II. Orlove 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. (Former course 162.)

136. Visual Anthropology (4) II. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 126 or 137. Overview of film use in anthropology and its implications in comparison to written ethnographic descriptions. Essentials features of ethnographic films 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, psychological, structural, symbolic, and marxian approaches. Selected controversies are examined to clarify strengths and limitations of extant theories. (Former course 102.)

138. Ethnographic Research Methods in Anthropology (4) II. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 137. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students to organize and conduct individual research projects.

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 the Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. (Former course 139A.)

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. (Former course 139B.)

141A. Indians of North America (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of the Indian of North America: origins, languages, civilizations, and history. (Former course 105A.)

141B. Native Americans in Contemporary Society (4) II. Forbes Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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. (Former course 106B.)

141C. Ethnography of California and the Great Basin (4) II. Bettinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Description and analysis of the native peoples of California and the Great Basin and their lifeways at the time of European contact. (Former course 106B.)

142. Peoples of the Middle East (4) III. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.)

143. Ethnology of Southeast Asia (4) I. Yoyngam 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. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality and social stratification, poverty, sociocultural responses to discrimination, and political responses to powerlessness.

145. Colonialism and Ethnicity in the Caribbean (4) I. Crowley Lecture—3 hours; discussion—1 hour. term paper. Prerequisite: course 2 or Afro-American Studies 10. Examination of the contemporary Caribbean nations, sketching their diverse geography, history, and economic life, then showing how selected nations have attempted to solve the problems arising from ethnic diversity in nation-building. (Former course 140.)

146. Indigenous Peoples of Mexico and Central America (4) II. Rousse Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of the native peoples of Mexico and Central America: their histories, socio-political organization, mythologies, languages, material culture, writing systems.

147. Peoples of the Pacific (4) III. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micro-nesia, and Melanesia. Consideration of recent changes associated with colonization and national independence.
148A. Traditional Chinese Society (4) III. Skinner
Lecture—3 hours, discussion—1 hour. Prerequisite: course 2. Analysis of society, culture, and political economy of late traditional China to 1949. Additional attention given to nature of social change in this pre-modern agrarian society.

154A. Ecology and Sociobiology of Primates (4) III. Rodman
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 154A for students interested in methods of studying, describing, and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of captive primates and local birds with quantitative analysis of observations.

154B. Comparative Primate Anatomy (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B. The functional anatomy of monkeys, apes, and man. Emphasis on the anatomical evidence for human evolution.

156. Human Osteology (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variation in race, sex, and age.

157. Anthropological Genetics (3) III. D.G. Smith
Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 100, 103, 105, or 106. Processes of micro-evolution responsible for biological differences among human populations. Special attention will be given to the adaptive significance of genetic markers examined in human blood group antigens, serum proteins and red cell enzymes.

157L. Laboratory in Anthropological Genetics (2) III. D.G. Smith
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and either Genetics 100 or enrollment in course 157 (concurrently or following). Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemagglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide gels, and starch gel electrophoresis on agarase. (FNP grading only.)

158. The Evolution of Females and Males: Biological Perspective (4) II. Hidy
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles.

170. Archeological Theory and Method (4) II. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Introduction to theory and method of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Topics to be discussed include: the role of theory in the development of human culture; the relationship of theory to practice; the role of theory in the interpretation of the past; and the role of theory in the education of the archeologist. (FNP grading only.)

171. Archaeology and the Environment (4) I. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Examination of the relationship between physical environment and human culture. Topics may include: the impact of environmental change on human cultural evolution; the role of technology in adaptation to environmental change; and the role of environment in the development of human culture. (FNP grading only.)

172. New World Prehistory: The First Arrivals (4) II. True
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. (Former course 103C.)

173. New World Prehistory: Archaic Adaptations (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. Introduction to and survey of prehistoric hunting and gathering societies in pre-Columbian North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. (Former course 103D.)

174. New World Prehistory: Formative Life-ways in North and South America (4) III. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Transition from hunting and gathering subsistence to sedentary farming in the American Southwest, Mississippial Valley, and Andean South America. (Former course 103E.)

175. New World Prehistory: The High Cultures Mesoamerica and Andean South America. (4) III. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Urban developments and the rise of civilization in Mexico and Peru. (Former course 103F.)

176. Prehistory of California and the Great Basin (4) II. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. (Former course 104A.)

177. Archaeology of the Pacific Rim (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3, 23, or consent of instructor; course 170 recommended. Archaeological problems and evidence pertaining to human colonization of and subsequent adaptation to various environments found on the Pacific Rim. Explanations are sought for important trajectories, trends and discontinuities in Pacific Rim cultural history.

178. Hunter-Gatherers (4) III. Bettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern hunter-gatherer societies in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

179. Ethnoarchaeology (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines residence patterning, site formation processes, hunting/foraging behavior and other artifact creating activities and how these contribute to modern archeological thinking. (Former course 193.)

181. Field Course in Archeological Method (9) Summer. The Staff
Lecture—6 hours, daily field investigation. Prerequisites: course 3; On-site courses in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archeological survey, mapping, and excavation. (Former course 195.)

182. Laboratory in Archeological Analysis (4) III Bettinger
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation; advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment. (Former course 196.)

184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) I. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed.

(e) Special Study Courses
194H. Special Study for Honors Students (1-5). I, II, III. The Staff (Chair: student approved, as special study course). Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. (FNP grading only.)

197T. Tutoring in Anthropology (1-5) I, II, III. The Staff
Tutorial—1 to 5 hours, Prerequisite: upper division standing with major in Anthropology and consent of Department Chairperson. May be repeated for credit. (FNP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (FNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (FNP grading only.)

Graduate Courses
201. History of Anthropological Theory (4) I. Yen-gowan
Lecture—2 hours; discussion—1 hour, term paper. Historical development of the various fields of anthropology with emphasis upon their interaction with the historical development of anthropology.

202. History and Theory of Biological Anthropology (4) III. McHenry
Seminar—3 hours; term paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology.
203. History and Theory of Archaeology (3) I. Betiligum
Seminar—3 hours. History of thought in archaeology and analysis of research methods.

204. Contemporary Issues in Anthropological Theory (4) II. Davis
Seminar—3 hours; term paper. Prerequisite: course 2, 137 or consent of instructor. Advanced consideration of fundamental issues in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.

205. History and Theory in Anthropological Linguistics (4) II. J.S. Smith
Seminar—3 hours; term paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology.

206. Research Design and Method in Social Anthropology (5) II. Joseph
Seminar—4 hours; individual student-instructor session (depthwork on special problems). Prerequisite: consent of instructor. Formulation of research problems and preparation of report proposals; relationships between theory and method, funding, pre-fieldwork preparations, entering the community, field research techniques, and problems of ethics, interview techniques, and report writing. May be repeated once for credit. Limited enrollment.

209. Objectives and Methods for College Teaching of Anthropology (2) I, II, III. The Staff
Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience and the professional literature.

210. Aspects of Culture Structure (4) II. Yengoan
Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and folklore. May be repeated for credit when topics differ.

211. Advanced Topics in Cultural Ecology (3) I. Orlove
Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 200 or equivalent consent of instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. (Same course as Ecology 211). 

216. Problems in Archeological Method (4) II. Beaton
Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

217. Andean Prehistory: Theory and Method (4) II. True
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-ceramic and early farming peoples.

218. Topics in North American Prehistory (4) II. Bettinger
Seminar—3 hours; term paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.

220. Field Course in Linguistics (4) III. Climted
Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 100, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

221. Cultural Transformation in Postcolonial Societies (4) II. Orlove
Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of instructor. Problems of cultural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

222. Problems in Urban Anthropology (4) I. Joseph
Seminar—3 hours; one paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on one 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) II. Curley
Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

225. Political Movements (4) III. Walton
Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. Interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, rational choice, moral economy, social class and gender.

229. 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. Crowley
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) I. Climted
Seminar—3 hours; term paper. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus Korea line. Supervised study of the primary and secondary sources. Work with informants when available.

246. Ethnology of Europe (4) I. Climted
Seminar—3 hours; term paper. Prerequisite: reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnohistory of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

252. Human Evolution Seminar (4) II. McHenry
Seminar—3 hours; term paper. Prerequisite: course 152 or the equivalent; consent of instructor. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, tertiary hominoids, Australopithecus, Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit.

253. Seminar in Human Biology (4) I. D.G. Smith
Seminar—3 hours; term paper. Prerequisite: course 153, 157, or consent of instructor. Study of selected topics in human biology. May be repeated for credit when topics vary.

254. Current Issues in Primates 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) I. Hody
Seminar—3 hours; term paper. Prerequisite: courses 15; 101/154 A or 154B; 158 or consent of instructor. Focus will be on reproductive strategies and parental investment. May be repeated for credit when topics vary.

265. Concepts and Problems in Applied Anthropology (4) II. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of complex changes; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

280. Ethnohistorical Theory and Method (4) II. 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 devoted to the applied uses of ethno-history in the solution of contemporary social problems.

292. Seminar in Linguistic Anthropology (4) II. J.S. Smith
Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

298. Group Study (1-4) I, II, III, The Staff (Chairperson in charge)
(SU grading only.)

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

990. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Michael P. Smith, Ph.D., Chairperson of the Department

Lancaster, V. Harper, Ph.D., Vice Chairperson of the Department

Department Office, 106 AOB 4

Community Studies and Development (916-752-0770)

Human Development (916-752-0771)

Faculty

Curt Acredolo, Ph.D., Lecturer
Louse M. Bachfeld, Ed.D., Professor Emeritus
Keith Barton, Ph.D., Professor
Marc Brammer, Ph.D., Lecturer
Stephen B. Bruh, Ph.D., Associate Professor
Brooke K. Boyan, Ph.D., Professor
Carol A. Carwright, Ph.D., Professor
James Chisholm, Ph.D., Associate Professor
Noreen G. Dowling, Ph.D., Lecturer
Isao Fujimoto, M.A., Lecturer S.O.E.
Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education

James Grishop, Ph.D., Lecturer
Lawrence V. Harper, Ph.D., Professor
Glenn R. Hawket, Ph.D., Professor Emeritus
Elwood M. Juergenson, Ph.D., Professor Emeritus
Martin F. Kenney, Ph.D., Associate Professor
Rozanene Kraft, Ph.D., Associate Professor
James G. Leising, Ph.D., Lecturer and Supervisor of Teacher Education

NOTE: For key to footnote symbols, see page 133.
David B. Lynn, Ph.D., Professor Emeritus
E. Dean MacCannell, Ph.D., Professor
Loren Parks, Ph.D., Lecturer
Robert W. Pershing, M.Ed., Lecturer
Marc Prilsuk, Ph.D., Professor
Emmanuel Pollett, Ph.D., D.V.M., Lecturer
Michael P. Smith, Ph.D., Professor
Kay Jeanne Stockman, Ph.D., Lecturer
Orville E. Thompson, Ph.D., Professor Emeritus
Jane N. Welker, M.A., Lecturer S.O.E.
Miriam J. Wells, Ph.D., Professor
Emmy E. Werner, Ph.D., Professor

The Major Program

The Applied Behavioral Sciences major provides a broad, comparative understanding of social science theories, methodologies, and issues relevant to the study of communities and the people in them. The program is concerned with the study of social organization and change, and with the ways that information can be used to solve social problems and improve quality of life. The major emphasizes the integration of theory and practical experience and features a perspective on learning that stresses self-development and critical thinking.

Two identifying features of the major are: (1) its interdisciplinary character, enabling students to bring together course work from different disciplines; and (2) its emphasis on viewing social problems in context, enabling students to master not only a circumscribed area of study, but also to understand the social environment in which the expertise will be applied.

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 and the people in them. In addition, the Applied Behavioral Sciences major includes a student-designed area of specialization to complement the student's academic and career interests. Examples of recently approved areas of concentration include: Organizational Planning and Management, Aging and Community Development, Community Health Development, Community Mental Health, Community Development and the Asian American, Social Environmental Planning, and Community Education.

Applied Behavioral Sciences graduates are prepared for occupations in community and human services, government social service agencies, non-profit organizations, and various human service organizations. The major provides effective preparation for graduate or professional study in the social and behavioral sciences.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Written/oral Expression</th>
<th>Preparatory Subject Matter</th>
<th>Community Development (Applied Behavioral Sciences)</th>
<th>Computer Science (Agricultural Science and Management 21 or Computer Science Engineering 10)</th>
<th>Economic Theory (Economics 1A or 1B)</th>
<th>Ethnicity and American Communities (Applied Behavioral Sciences 2)</th>
<th>Social Science Theory (Anthropology 2 or Sociology 1)</th>
<th>Statistics (Statistics 13 or 32)</th>
<th>Breadth/General Education Requirement</th>
<th>Environmental Studies 10, 101, 133</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12</td>
<td>3-4</td>
<td>22-24</td>
<td>Community Development (Applied Behavioral Sciences) 1, 151, 152, 164</td>
<td>16</td>
<td>2 courses selected from the 600 and/or 170 series</td>
<td>8 (Applied Behavioral Sciences 162, 163, 168)</td>
<td>(Applied Behavioral Sciences 171, 172, 173, 174, 175, 176, 178)</td>
<td>3-4</td>
<td>24</td>
<td>24</td>
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</tbody>
</table>

Minor Program Requirements:

The Applied Behavioral Sciences faculty offers the following minor program:

| Units | Community Development | Applied Behavioral Sciences 1, 151, 152, 164 | 16 | 8 (Applied Behavioral Sciences 162, 163, 168) | 3-4 | 24 |

Course in Applied Behavioral Sciences

Lower Division Courses

1. The Community (4) I MacCannell

Lecture—4 hours. Introduction to the concept of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban, ghetto, suburban, rural, and California farming towns.

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, ethnic identity, and power and issues related to selected American ethnic groups. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

17. Population and Community (2) II. Fujimoto

Lecture—2 hours. Dynamics and challenges faced by demographic changes in California and the world community. Implications for individuals and communities. Special emphasis on the possible contributions each individual can make towards resolving global problems related to human ecology through local community action. (P/N/P grading only.)

18. Science and Society (3) III. The Staff

Lecture—2 hours; discussion—1 hour. Assumptions and biases in different fields of knowledge, taboo topics, and the nature of evidence in the public and academic communities; fit between University education and issues of society.

47. Orientation to Community Resources (2) II. Thompson, III. Fujimoto

Field—3 or 4 days; seminar—3-9 hours. Course given between quarters. Prerequisite: consent of instructor. Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve the needs of families and children. Advance reservations required. (P/N/P grading only.)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—3-96 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/N/P grading only.)

95. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/N/P grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/N/P grading only.)

Upper Division Courses

151. Community Research and Analysis (4) II. Fujimoto

Lecture—4 hours. Prerequisite: course 1, Sociology 2, Anthropology 2, or Geography 5. Theories of community change and structure. Ethnographic, power structure and comparative approaches to community studies. Use of research in community development programs. Students work in teams and conduct fieldwork in nearby communities. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Geography 5, or Sociology 2.

152. Community Development (4) II. Fujimoto

Lecture—4 hours. Prerequisite: course 151 or 1, Sociology 2, Anthropology 2, Geography 5, Asian American Studies 100, Chinese Studies 132, or African American Studies 101. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of community agents in the development process. Students work in teams and conduct fieldwork in local communities.

153. International Community Development (4) III. Fujimoto

Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of global forces on community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Applied Behavioral...
course 160, 161, or the equivalent. Program evaluation and its relationship to organizational development and management functions. Focuses on internal evaluation and its role in program planning improvement and accountability.

170. Communication of Innovations (4). I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Emphasizes communication exchange and preparation, diffusion in 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 dissemination.

171. Housing and Social Policy (4). III. Wells Lecture—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policy strategies at the national levels.

172. Social Inequality: Issues and Innovations (4). III. Wells Lecture—4 hours; prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudice, power, and the culture of poverty. Discussion of arguments concerning race, sex, and genetic potential.

173. The Continuing Learner (4). II. The Staff Lecture—4 hours; prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.

174. Communication for Community Change (4). Grieshop Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course 1 recommended. Applied communication programs used for creating community change. Planning and evaluating programs, social marketing, and other communication strategies and technologies. Ethics of change induced through communication are also considered.

175. Education in the Community (4). Grieshop 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 nonformal education to formal education, schooling to community, and individual, community, and national development. Theoretical and practical aspects of education in the community. Offered in odd-numbered years.

176. Comparative Ethnicity (4). III. The Staff Lecture—4 hours; prerequisite: upper division standing. 8 units of sociology or anthropology or combination. Examination of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches and issues arising from the study of ethnicity, through utilization of data from a range of different societies.

177. Social Networks and Community Health (4). III. Pliisk Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Sociology 2. Relevance of social ties to the health and well-being of 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 of contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2.

190. Current Issues in Applied Behavioral Sciences (11). 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. (PINF grading only.)

192. Internship (1-12). II, III. The Staff (Chairperson in charge)

Field placement—3-36 hours. Prerequisite: completion of 84 units and consent of intern. Supervising internship, off and on campus, in community and institutional settings. (PINF grading only.)


196. Senior Project in Applied Behavioral Sciences (1-5). I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Guided independent research culminating in a written thesis. May be repeated for credit. (PINF grading only.)

197T. Tutoring in Applied Behavioral Sciences (1-5). I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Supervised tutoring in the community. (PINF grading only.)

199. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge) (PINF grading only.)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4). The Staff Lecture—3 hours; supervised 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, dynamic of resource allocation, assessment 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). III. Goldman Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; knowledge of social science research design and methods. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of relationship between organizational planning, decision-making and evaluation research; value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

240. Community Development: Research and Analysis (4). I. McCarron Seminar—4 hours. Prerequisite: course 160 or Sociology 48A or the equivalent and a course in statistics. Methods for analyzing institutional, community, and regional social structure, as preparation for planned change. Research design and management of large-scale data files.

241. The Economics of Community Development and Planning Strategies (4). II. Rochin (Agricultural Economics) Seminar—4 hours. Prerequisite: course 240 and a principle course in economics. Economic theory and planning strategies affecting nonmetropolitan communities. Human resources, community services and infrastructure, industrialization and technological change, policies and plans for mobilizing resources for community development.

NOTE: For key to footnote symbols, see page 133.
Applied Mathematics (A Graduate Group)

J. Blake Temple, Ph.D., Chairperson of the Group
Group Office, 551 Kerr Hall (916-752-8131)

Faculty. Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Agricultural Economics, Biological Sciences, Chemistry, Computer Science Engineering, Economics, Chemical, Civil, Electrical, and Mechanical Engineering, Environmental Studies, Epidemiology and Preventive Medicine, Genetics, Land, Air and Water Resources, Management, Mathematics, Obstetrics and Gynecology, 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 (1) for further study in applied mathematics or an application area, or (2) for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and teaching. Among the benefits of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter only.

Preparation. The program encourages application from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, vector calculus and a rigorous course in advanced calculus is encouraged.

Graduate Advisers. D.O. Banks (Mathematics); A.M. Hastings (Design).

Applied Physics

See Physics

Aquaculture

See Animal Science; Agricultural Engineering Technology; and Wildlife and Fisheries Biology

Art

(College of Letters and Science)
Cornella Schulz, M.F.A., Chairperson of the Department
Department Office, 111A Art Building (916-752-0105)

Art History

Faculty
Joseph A. Baird, Ph.D., Professor Emeritus
Daniel J. Crowley, Ph.D., Professor (Art, Anthropology)
Mary H. Fong, Ph.D., Professor
Robert J. Grigg, Ph.D., Associate Professor
Seymour Howard, Ph.D., Professor
Dianne Sachko Mackeld, Ph.D., Associate Professor
Irl Fogel, Ph.D., Assistant Professor
Jeffrey Ruda, Ph.D., Associate Professor
Deborah Weiner, Ph.D., Assistant Professor

The Major Program

The History of Art program focuses upon the influential role of the visual arts in civilization. It examines works of art as illustrations of changing aesthetic and cultural viewpoints and as reflections of significant material and ideological developments in society. Art history is unusual among the humane disciplines in that it emphasizes visual as well as verbal intelligence, providing more than the standard advantages of a liberal arts training. This program offers a wide and representative introduction to the major fields and issues in art historical studies.

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 teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment. Since the study of art history deals with the history of ideas and with different cultures, societies, and events as well as objects and images, we urge majors to strengthen their training with courses in history, literature, philosophy, foreign languages, and political science.

A.B. Major Requirements:

Preparatory Subject Matter: .............................................. 28
Art 1A, 1B, 1C, 1D, 25
One art studio course in drawing, graphics, painting, or photography: .......... 4
One art studio course in sculpture or ceramics: .............................................. 4

Depth Subject Matter: .................................................... 36
Nine upper division art history courses, which must be taken in at least five of the following seven areas: .................................................... 36
(a) Ancient
(b) Medieval/Northern Renaissance
(c) Southern Renaissance/Baroque
(d) Modern Painting, Sculpture
(e) Modern Architecture
(f) China/Japan
(g) Non-Literate

Total Units for the Major: .................................................. 60

Minor Program Requirements:

Art History: .............................................. 20
Five upper division art history courses (one lower division substitute course permissible): .............................................. 20
Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area:
(a) Ancient
(b) Medieval/Northern Renaissance
(c) Southern Renaissance/Baroque
(d) Modern Painting, Sculpture
(e) Modern Architecture
(f) China/Japan
(g) Non-Literate

Honors Program. An Honors Program is available in Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade-point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes one quarter of language in German or Chinese, one seminar (courses 190 or 196), and writes an honors thesis (course 199). Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors, or for the Letters and Science 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 Department of Art offers programs of study and research 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 Advisor or consulting the Graduate Announcement.

Courses in Art (History)

Lower Division Courses

1A. Ancient Art (4) I. Howard
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. General Education credit with concurrent enrollment in course IAG: Civilization and Culture/Introductory, (CAN Art Seq A)

1AG. Writing: On Ancient Art (1) I. Howard
Discussion—1 hour; short papers. Prerequisite: course 1A (concurrently). Small group discussions and preparation of short papers for course 1A. General Education credit with concurrent enrollment in course 1A: Civilization and Culture/Introductory.

NOTE: For key to footnote symbols, see page 133.
1B. Medieval and Renaissance Art (4) II. Grigg Lecture—3 hours; discussion—1 hour. Christian, Bar- barian, Moslem, 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/Introductory. (CAN Art Seq A)

1BG. Writing: On Medieval-Renaissance Art (1) II. Grigg Discussion—1 hour; short papers. Prerequisite: course 1B (concurrently). Small group discussions and preparation of short papers for course 1B. General Education credit with concurrent enrollment in course 1B: Civilization and Culture/Introductory.

1C. Baroque and Modern Art (4) III. Macleod Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. General Education credit with concurrent enrollment in course 1C: Civilization and Culture/Introductory.

1D. Asian Art (4) II. Fong Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian textiles, Chinese ceramics, Japanese prints, and art in Mao's China. General Education credit with concurrent enrollment in course 1D: Civilization and Culture/Introductory.

1DG. Writing: On Asian Art (1) II. Fong Discussion—1 hour; short papers. Prerequisite: course 1D (concurrently). Group discussions and preparation of short papers for course 1D. General Education credit with concurrent enrollment in course 1DG: Civilization and Culture/Introductory.

1H. Introduction to Art: Art and Civilization (4) II. Ruda Lecture—3 hours; term paper or gallery studies and review. Looking at art to understand how aesthetic experience relates to its cultural context, in a variety of historical situations from ancient to modern times. Intended for students not specializing in art. (P/NP grading only.)

15. Woman as Artist and Subject (4) I. Macleod Lecture—3 hours; discussion—1 hour. Assessment of women's contributions to the visual arts. Examines the role of women in context of major artistic and social movements from Renaissance to present. Two midterms; final examination. Offered in even-numbered years.

20. Myths and Symbols in Chinese Art (4) III. Fong Lecture—3 hours; discussion—1 hour. Heritages of China as seen in the artistic expressions of its mythologies and symbols perpetuated in folk cults, ancestral worship, Confucian lores, Taoist legends, and Buddhist beliefs. Intended for non-majors.

25. Introduction to Architectural History (4) III. Weiner Lecture—3 hours; discussion—1 hour. Formal and social history of architecture, examining design principles, major traditions, and concepts of architectural history, with a focus on issues in Western architecture. Emphasis on the nineteenth and twentieth centuries. General Education credit with concurrent enrollment in course 25G: Civilization and Culture/Introductory.


98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge);

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge); Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

15A. Early Greek Art and Architecture (4) I. Howard Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of the history and significance of monument in Greek art and architecture from the Homeric, Geometric Age to the Golden Age and the death of Socrates.

15B. Later Greek Art and Architecture (4) II. Howard Lecture—3 hours; study and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander the end of the Hellenistic Age and the death of Cleopatra.

155. Roman Art (4) III. Howard Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome.

162. 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.

163A. Chinese Art (4) III. Fong Lecture—3 hours; term paper or gallery studies and review. A survey of Chinese art from the thirteenth century to the present. Major art forms that are traditionally known as well as newly discovered through archaeology in China.

163B. Chinese Painting (4) III. Fong Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers and birds, and landscape—the favorite and enduring theme of the Chinese scholar-painters.

163C. Painting in the People's Republic of China (4) III. Fong Lecture—3 hours; term paper. Prerequisite: course 10D or 163B. 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 or gallery studies and review. A survey of Japanese art from the sixteenth century to the present. Major art forms that are traditionally known as well as newly discovered through archaeology in China.

165. Great China (4) III. Weiner 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 odd-numbered 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 Empire; the early Roman Empire in the West and to the final culture of Constantinople.

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) III. Grigg Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northwestern 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 fifteenth century in Flanders, France, and in the Lowlands, including such artists as Van Eyck and Hieronymus Bosch.

177B. Northern European Art (4) I. Grigg Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

178A. Italian Renaissance Art (4) I. Ruda Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Piero della Francesca and in the early sixteenth century. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B–18B.

178B. Italian Renaissance Art (4) II. Ruda Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Piero della Francesca and in the early sixteenth century. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B–18B.

178C. Italian Renaissance Art (4) III. Ruda 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 centuries.

179B. Baroque Art (4) I. Ruda Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez. Offered in odd-numbered years.

182. British Art (1750–1914) (4) III. Macleod Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture — 1750 to 1914. Topics include influences of class and gender, patronage, economic needs, and social trends. Artists: Hogarth, Turner, Pre-Raphaelites, and lesser-known advocates of municipal art, social realism, and colonial themes.

183A. Art in the Age of Revolution (4) II. Macleod Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Analysis of political and stylistic implications of European painting from 1750 to 1860. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet.

183B. Impressionism and Post-Impressionism (4) III. Macleod Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including an

NOTE: For key to box notes, see page 133.
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 studied include Picasso, Matisse, Kandinsky, Malevich, and Pollock.

183D. Modern Sculpture (4) I. Howard
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. MacLeod
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. Rogoff
LECTURE—3 hours; discussion—1 hour. Prerequisite: course 183A, 183B, 183C, or 184. Introduction to the artist's movements which traditionally constitute twentieth-century Modernism. Study will be divided into sessions dealing with formal and social issues, and exhibitions critically examining the emergence of individual artists as representatives of such movements.

184. Twentieth Century Architecture (4) III. Weiner
LECTURE—3 hours; term paper. Prerequisite: course 25 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged.

185. History of Art Collecting (6) II. Howard
LECTURE—3 hours; gallery study and paper. Study of the major eras, personalities, objects, theories, and practices in western art collecting. Care and presentation of works of art from antiquity to the present.

186. After Modernism: 1968 (4) II. Rogoff
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, late structuralist thought, pop art, conceptual art, performance art, and Fluxus movement.

187. Word and Image in German Modernism (4) I. Rogoff
LECTURE—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory dealing with word/image relationship within the alternative tradition of European modernism. Images and key texts of Expressionism, Blue Rider, Dada, Bauhaus, N.S. Mexicans, Weimar Film, and Post War Restoration examined.

188. Architecture of the United States (4) II. Weiner
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 were created. Issues include ideals of domesticity and the development of the architectural profession.

189C. Painting of the United States (4) II. MacLeod
LECTURE—3 hours; discussion—1 hour; term paper or gallery study and photographic pictorial development from 1650 to the present, with emphasis on twentieth-century developments.

190. Undergraduate Seminar (4) I. The Staff (Chairperson in charge)
LECTURE—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

192. Internship (2-12) I, II, III. The Staff (Chairperson in charge)
Internship—term paper or catalogue. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

194H. Special Study for Honor Students (4) I, II, III. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: course 190 or the equivalent, as determined by the major adviser. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee.

198. Directed Group Study (1-5) I, II, III. The Staff (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. Introduction to Art Historical Research (4) I. The Staff
Seminar—4 hours. Instructor sampling of major writings, methods, and sources used for research in the discipline of art history.

250. Problems in Art Historical Research (4) III. Howard
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 Primitive Art (4) II. Crowley
Seminar—3 hours; term paper. Selected areas of special study in the arts of Africa, Oceania, and Pre-Hispanic Europe; in certain years, study of the Indians of the Americas, pre-Conquest to contemporary. May be repeated for credit with consent of instructor.

254. Seminar in Classical Art (4) III. Howard
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) I. 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) I. 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.

277. Seminar in Northern Renaissance Art (4) III. 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) II. Ruda
Seminar—3 hours; term paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor.

283. Seminar in Modern European Art (4) II. MacLeod
Seminar—3 hours; term paper. Selected areas of special study in art since 1800 in Europe. May be repeated for credit with consent of instructor.

NOTE: For key to footnote symbols, see page 133.

286. After Modernism: The Eighties (4) III. Rogoff
Seminar—3 hours; term paper. Prerequisite: course 186; course 183A, 183B, 183C, or 184 recommended. Selected areas of special study of post-structuralist critiques 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 new practices and forms. May be repeated for credit with consent of instructor.

299. Individual Study (1-4) I, II, III. The Staff (Chairperson in charge)
(GU grading only.)

Professional Courses

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. (GU grading only.)

Professional Courses

401. Museum Training: Curatorial Principles (4) II. Aragon

402. Museum Training: Exhibition Methods (4) II. Aragon
Seminar—3 hours; exhibit study of history of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting techniques and display with emphasis on actual design. Experimentation with unusual presentation forms.

Note: Various of the above courses are not offered each year; please check quarterly schedules.

Art Studio

Faculty
L. Price Amerson, Jr., Ph.D., Adjunct Lecturer (Director, Nelson Gallery)
Squeak Carnwath, M.F.A., Associate Professor
Richard D. Cramer, M.F.A., Professor Emeritus
Roy Deforest, M.A., Professor
William Henderson, M.F.A., Professor
Harvey Hirshfield, M.A., Professor
David Hollowell, M.F.A., Assistant Professor
Ralph M. Johnson, M.A., Professor Emeritus
Manuel J. Neri, Professor Emeritus
Roland C. Peterson, M.A., Professor
Ludwig Pets, M.F.A., Assistant Professor
Int Rogoff, Ph.D., Assistant Professor
Cornelia Schulz, M.F.A., Professor

The Major Program

Studio Art offers courses leading to the Bachelor of Arts degree. The program is composed of courses which provide knowledge and skill which are necessary to a broad understanding of the visual aspects of the humanities and provides a basis for further study and practice, leading to careers in the profession of artist, teacher and other aspects of the field of art.

Advanced Standing. Entering freshmen who have studied art in high school should apply for advanced standing by taking the College Board Advanced Placement Examination (AP). See the Academic Information chapter of this catalog.
**Portfolios.** Students at Davis should keep a continuing portfolio of their art work which is subject to faculty approval at such times as when the student is declaring a major, trying to add the first day of class (the department gives preference to students who have preenrolled), requesting independent study courses, etc.

**Transfer Students.** Prior to enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>300-400 courses from Art 2, 3, 4, 5, 16, see prerequisites required for upper division courses</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Two courses from Art 1A, 1B, 1C, 1D</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

### Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Six courses, under three different instructors, chosen from Group A, Practice of Art</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One course from Group B, Theory and Criticism prior to enrollment in upper division courses</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Two upper division courses in art history</td>
<td>8</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td></td>
<td>56</td>
</tr>
</tbody>
</table>

**Recommended:**
(a) Students interested in drawing and painting should take Art 2, 3, 4 (course 5 is recommended);
(b) Students interested in sculpture should take Art 2, 3, 4 (course 5 is recommended);
(c) Students preparing for graduate work in any of the environmental design professions should take Art 2, 5, 16.

### Major Advisers
See the Class Schedule and Room Directory.

### Minor Program Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Art Studio</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible)</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Prerequisite courses must be taken before entering upper division courses. Independent study courses are not applicable.</td>
<td></td>
</tr>
</tbody>
</table>

### Teaching Credential Subject Representative
Department Chairperson. See the Teacher Education Program.

### Graduate Study
The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. Detailed information regarding graduate study may be obtained from the Graduate Announcements or Graduate Admissions Office.

### Courses in Art (Studio)

<table>
<thead>
<tr>
<th>Units</th>
<th>Lower Division Courses</th>
<th>2, Drawing I (4) I, II, III. Carnwath, Henderson, Schult, and staff</th>
<th>2, Painting I (4) I, II, III. Hendon, Hollowell and staff</th>
<th>2, Sculpture I (4) I, II, III. Puls and staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white. (CAN Art 8)</td>
<td>Laboratory—8 hours; to be arranged—4 hours.</td>
<td>Laboratory—8 hours; to be arranged—4 hours.</td>
<td>Laboratory—8 hours; to be arranged—4 hours.</td>
</tr>
<tr>
<td></td>
<td>3, Drawing II (4) I, II, III. Hollowell and staff</td>
<td>Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2. Form and composition in color.</td>
<td>Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2. Form and composition in the human figure as a subject.</td>
<td>Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2. Form and composition in the human figure as a subject.</td>
</tr>
</tbody>
</table>

### Notes

- **121A. Architectural Design** (4) I. Cranmer Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 5, 16, or compensating backgrounds in design or engineering. Small buildings as art forms, visualized in cardboard, balsa, or plaster models.
- **125. Printmaking: Relief** (4) I. Peterson 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 media.
- **126. Printmaking: Intaglio** (4) I, II, III. The Staff Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, hard- and soft-ground, burin engraving and related methods. May be repeated once for credit with consent of instructor.

**127. Printmaking: Lithography** I. Defoe Laboratory—6 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** I. 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: Non-Metallic Materials** I. Puls Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in compliant materials, e.g., wood, plaster, plastics. May be repeated once for credit with consent of instructor.

**142. Sculpture: Ceramics I** I, III. Arnson Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Introduction to ceramic forms and processes.

**143. Sculpture: Ceramics II** I. Arnson Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: course 142 or consent of instructor. Further instruction, to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

**144. Sculpture: Figure Modeling** I. Neri Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

**145. Sculpture: Concepts and Materials** I, II. Puls Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2 and 5. Relationship between ideas and three-dimensional visual communication is explored in depth through the use of a variety of approaches and materials. May be repeated once for credit with consent of instructor.

**146. Sculpture: Ceramics III** I, III. Arnson Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 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** I, II. Himelfarb Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present.

**148. Theory and Criticism: Painting and Sculpture** I, II. Himelfarb Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

### Group C: Special Study Courses

**192. Internship (2-12)** I, II, III. The Staff (Chairperson in charge)
Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

**193. Seminar in Art Practice** I. The Staff (Chairperson in charge)
Discussion—laboratory—12 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division status taken in courses in upper division drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) done for group discussion and criticism, as well as group discussion of contemporary art practices in the visual arts. Offered in odd-numbered years.

**196. Directed Group Study (1-5)** I, II, III. The Staff (Chairperson in charge)
NOTE: For key to footnote symbols, see page 130.
Asian American Studies

(College of Letters and Science)

George Kagawa, Ph.D., Program Director
Program Office, 158 AOB 4 (916-752-3625)

Committee in Charge
Vincent A. Crockenberg, Ph.D. (Education)
Roy H. Doi, Ph.D. (Biochemistry and Biophysics)
Isao Fujimoto, M.A. (Applied Behavioral Sciences)
Mary Jackman, Ph.D. (Political Science)
George Kagawa, Ph.D. (Asian American Studies)
Pete C.Y. Leung, M.S. (Asian American Studies)

Faculty
George Kagawa, Ph.D., Director
Pete C.Y. Leung, M.S., Lecturer S.O.E.

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. (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:

UNITS

Asian American Studies 20
Asian American Studies 100, 110, 115, 116, 120, 125
An additional three courses from Asian American Studies 101, 111, 112, 130, 192
(No more than 4 units of 192 may be counted toward this total)

Minor Advisor: P.C.Y. Leung

Courses in Asian American Studies

Direct questions pertaining to the following courses to the instructor of:
Asian American Studies Program, 158 AOB 4 (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 Asians 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, Kagawa

Lecture-discussion—4 hours. Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. Offered fall and spring quarters in odd-numbered years.

20. Calligraphic Expression in Asian American Culture (3) I, Leung

Lecture—2 hours; studio—3 hours. Survey the lega- cy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through some basic tracing, traces origins and principles of Chinese and Japanese calligraphy. Offered in even-numbered years.

92. Internship (1-3) I, II, III, The Staff (Director in charge)

Internship—3-9 hours. Prerequisite: enrollment dependent on availability of internship positions and consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III, The Staff (Director in charge)

Primary interest for lower division students. (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, The Staff (Director in charge) (P/N grading only.)

Upper Division Courses

100. Asian American Communities (4) I, Kagawa

Lecture-discussion—4 hours. Prerequisite: Course 110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

101. Language and Educational Issues of Asian Immigrants (4) I, Leung

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity in American society, especially in public schools. Overview of public policies on language and programs, particularly for Asian

NOTE: For key to footnote symbols, see page 133.

Asian American Studies

119. Theoretical Perspectives in Asian American Studies (4) I, Kagawa

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.

111. Ethnic Self and Identity (4) II, Kagawa

Lecture-discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the cultural, social, and political situation of Asian and Pacific American women using theoretical perspectives from social science disciplines, socialization, family dynamics, domestic and political power, economic production, and division of labor.

130. Asian American Culture Through Literature (4) II, The Staff

Lecture-discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Analysis of Asian American writings as expressions of various cultural, psychological, and social issues, and their impact on the development and influence of Asian American culture in the United States.

155. Legal History and the Asian American (4) I, The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Examination of the relationship between the Philippine-American community, the Philippines, and the American community through a critical reevaluation of the historical and contemporary conditions, problems, and prospects of Filipinos in the U.S.

192. Internship (1-5) I, II, III, The Staff (Director in charge)

Internship—3-15 hours. Prerequisite: enrollment dependent on availability of intern position with prior to Asian American Studies minor. Supervised internship in community and institutional settings related to Asian American concerns. (P/N grading only.)

197. Tutoring in Asian American Studies (1-5) I, II, III, The Staff (Director in charge)

Tutoring—1-5 hours. Prerequisite: upper division standing and completion of appropriate course with distinction; consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated for credit once for a given course and also for a different course. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III, The Staff (Director in charge)

Prerequisite: consent of instructor. Primarily intended for upper division students. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Director in charge) (P/N grading only.)

Courses in Cantonese

Lower Division Courses

1-23. Elementary Cantonese (5-5-5) I-II, Leung

Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250
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 physics of meteorological processes, including general Circulation of the atmosphere and weather systems; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; turbulence and diffusion; atmospheric interaction with the biosphere; climate variations; air pollution meteorology; and developments in modern meteorological instrumentation. This field is based on applied mathematical physics, and is strongly relevant to environmental biology and human ecology. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, and numerical weather forecasting. The course of study provides a mathematical and physical science background on which a career can be built in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in meteorology, the major includes a minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

Units

Written/Oral Expression .............................................. 7-8
See College requirement .............................................. 7-8
Preparatory Subject Matter .................................. 63
Biological sciences (Biological Sciences 1A, 1B) .................. 10
Chemistry (Chemistry 1A, 1B) ................................... 10
Computer science (Engineering 5 or the equivalent in FORTRAN programming) .................................................. 3
Mathematics (Mathematics 21A, 21B, 21C, 22A, 22B, 22C) .............. 21

Meteorology (Atmospheric Science 60) ................... 4
Physics (Physics 11, 12) .............................................. 12
Statistics (Statistics 33) .............................................. 3

Breadth/General Education .................................... 28
Satisfaction of General Education requirement .................. 8-24

Additional courses in sciences and humanities to total 28 units

Depth Subject Matter ........................................... 30
Atmospheric Science 110A, 110B, 120, 121A, and 121B .................. 17
Upper division Atmospheric Science courses selected with advisor’s approval ............................................................ 13
If both courses 120 and 133 are taken, only 4 units may be counted. No more than 3 units of courses 192 and 199 may be counted.

Restricted Electives .............................................. 21
Earth and planetary sciences (choose from Environmental Studies 116, 150A, 150B, Geography 116, 117, Geology 105, 113, 115, Resource Sciences 103, Soil Science 100, Water Science 100, 141, or courses approved by advisor) .................. 6
Coordinated group of courses (minor area) to be chosen with advisor’s approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science ..................................................... 15

Unrestricted Electives .............................................. 30-31
Total Units for the Degree .................................. 180

Major Adviser. R. C. Shaw (Land, Air and Water Resources).

Advising Center for the major, as well as for graduate studies, is located in 122 Hoagland Hall, Land, Air and Water Resources Teaching Center (916-752-1669).

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 Division section in this catalog.

Related Courses. See Environmental Studies 150A; Geography 3, 115, 116; Physics 104A, 104B; Resource Sciences 103, 131.

Courses in Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center, 122 Hoagland Hall (916-752-1669).

Lower Division Courses

10. Severe and Unusual Weather (3) I. Soong II. Carroll, Weare
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 10, high school physics or the equivalent. Extreme or unusual weather events; e.g., floods, blizzards, hurricanes, tornadoes and desertification. Emphasis placed on scientific perspective and human context. Not intended for students majoring in the physical sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE courses: 10.

60. Introduction to Atmospheric Science (4) I. Shaw
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21C and Physics 9A. Introduction to atmospheric units in social science in the natural sciences and engineering. Application of laws of physics to the atmospheric system. Introduction to atmospheric radiation, thermodynamics and dynamics. Physical basis of modern weather forecasting.

92. Atmospheric Science Internship (1-12) I, II, III.
The Staff (Chairperson in charge)
Laboratory—6-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

105. Microclimate of Agricultural Systems (3) I. Paw U
Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Intended for nonmajors. Energy balance, air and soil temperature, wind, water vapor, carbon dioxide patterns within the microclimate structure. Microclimate modification by windbreaks, frost protection, and other methods of energy balance manipulation. Students who have completed course 133 may receive only one unit of credit. Offered in odd-number years.

110A. Weather Analysis and Forecasting (4) III. Soong
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B (may be taken concurrently). Thermodynamic variables and processes; kinematics and dynamic processes and their relationship to observed weather. Laboratory work includes thermodynamic diagrams, pressure surface and vertical cross-section analysis.

110B. Weather Analysis and Forecasting (5) I. Carroll
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110A, knowledge of FORTRAN (Engineering 5). Application of dynamic theory to weather systems. Special emphasis on remote sensing of weather variables, numerical weather prediction, satellite meteorology and tropical meteorology. Laboratory emphasis on the analysis and forecasting of current weather situations.

120. Atmospheric Thermodynamics and Statics (4) III. Wease
Lecture—3 hours. Prerequisite: Mathematics 22C; Physics 9A; course 60 (may be taken concurrently). Atmospheric at rest: atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, hydrometeor equilibrium and stability criteria, and thermodynamic diagrams in meteorology.

121A. Atmospheric Dynamics (3) II. Nathan
Lecture—3 hours. Prerequisite: course 120; Mathematics 22C; Physics 9B. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulation; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology.

121B. Atmospheric Dynamics (3) III. Nathan
Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes; cumulus models.

124. Meteorological Instruments and Observations (3) I. Paw U
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 60; Physics 9C. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. Offered in odd-numbered years.

128. Radiation and Satellite Meteorology (3) II. Weare
Lecture—3 hours. Prerequisite: course 60; Physics 95 (may be taken concurrently). Mathematics 22B;
220. Atmospheric Processes (3). I, II, III. The Staff. Lecture—3 hours. Prerequisite: Mathematics 22B-22C; 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 129. Credit not to be given to students who have completed any two of these courses.

221. Advanced Atmospheric Dynamics (3). II, III. The Staff. Lecture—3 hours. Prerequisite: courses 121B and 240. Emphasis on recent theoretical work in dynamic meteorology. Derivations of filtered equations from the primitive equations of the atmosphere. Emphasis will be given to radiative transfer and remote sensing, global atmospheric chemistry, and the physical and dynamic processes in the upper atmosphere.


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-order methods. Offered in even-numbered 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 odd-numbered years.

233. Topics in Advanced Biometeorology (3). II. Paw U. Lecture—2 hours. Discussion—1 hour. Prerequisite: courses 33 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 odd-numbered years.

240. General Circulation of the Atmosphere (3). I. Grothjahn. Lecture—3 hours. Prerequisite: courses 121B. Large-scale, observed atmospheric circulation. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features.

241. Climate Dynamics (3). III. Weare. Lecture—3 hours. Prerequisite: 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 even-numbered years.

250. Meso-Scale Meteorology (3). III. 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 odd-numbered years.

270A-G. Topics in Atmospheric Science (1-3). I, II, III. The Staff. Discussion—1-3 hours. Applications and concepts in (A) Meteorological Statistics; (B) Computer Modeling of the Atmosphere; (C) Design of Experiments and Field Studies in Meteorology; (D) Solar and Infrared Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

290. Seminar (1). I, II, III. The Staff (Chairperson in charge). Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interest. (SU grading only.)

291A-D. Research Conference in Atmospheric Science (1-3). I, II, III. The Staff. Discussion—1 hour. Review and discussion of current literature in: (A) Air Quality Meteorology; (B) Biometeorology; (G) Boundary Layer Meteorology; (D) Climate Dynamics. May be repeated up to a total of 5 units per segment. (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.)

299. Research (1-12). I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing and consent of instructor. (SU grading only.)

### Atmospheric Science (A Graduate Group)

Richard D. Grothjahn, Ph.D., Chairperson of the Group (916-752-2246)

Group Office, 151 Hoagland Hall (916-752-1406)

Faculty. Includes nineteen faculty members from the Departments of Land, Air and Water Resources, Agricultural Engineering, Civil Engineering, Geography, Physics, the Laboratory for Energy-Related Health Research, and the Division of Environmental Studies.

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can place major emphasis on graduate work in one of the following fields: air quality meteorology, biometeorology, boundary-layer meteorology, climate dynamics, large scale dynamics, and mesoscale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Considerable flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.


Graduate Admissions Officer. T.R. Nathan (Land, Air and Water Resources, 752-1600).

### Avian Medicine

See Epidemiology and Preventive Medicine

### Avian Sciences

(College of Agricultural and Environmental Sciences)

Hans Abplanalp, Ph.D., Chairperson of the Department

Department Office, 3202 Meyer Hall (916-752-1300)

Faculty.

Ursula K. Abbott, Ph.D., Professor

Hans Abplanalp, Ph.D., Professor

Francis A. Bradley, Ph.D., Lecturer

Ralph A. Ernst, Ph.D., Lecturer

C. Richard Grau, Ph.D., Professor Emeritus

Annie J. King, Ph.D., Assistant Professor

Note: For key to footnote symbols, see page 135.
Advising Center for the major is located in 3202 Meyer Hall (916-752-1300).

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 Division section in this catalog.

Related Courses. See Agricultural Economics 120; Food Science and Technology 120, 123, 121; International Agricultural Development 102; Nutrition 123; Physiology 117; Zoology 100, 100L.

Courses in Avian Sciences

Lower Division Courses

11. Introduction to Poultry Science (3) I. Bradley Lecture—3 hours. The masonic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. General Education credit: Nature and Environment/Introduction.

11L. Laboratory in Avian Sciences (1) I. Bradley Laboratory—3 hours. Prerequisite: course 11 (may be taken concurrently). Demonstrations, laboratory exercises, management of experimental birds, anatomy, reproduction, egg incubation, nutrition, health and welfare of domestic birds; data collection techniques.

12. Birds, Humans, and the Environment (4) III. Wilson Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: course in biology recommended. Studies of birds and human activities; emphasis on understanding the role of birds in the natural environment.

92. Internship in the Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge). Prerequisite: sophomore standing preferred; consent of instructor. Work-learning experience on and off campus in poultry, gamebirds, or exotic bird production, management and research; or in a business, industry, or agency concerned with these activities. Completion with Internship Approval Request form essential. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: permission of instructor. Special study of problems in avian biology; nutrition, breeding, and physiology of poultry, wild birds, and their products. (P/NP grading only.)

Upper Division Courses

100. Principles of Avian Sciences (5) II, III. The Staff Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A or 1B, Genetics 100. Study of major groups of birds, their adaptations, and their ecological relationships. (P/NP grading only.)

101. Patterns in Avian Biology (3) I. Weathers Lecture—3 hours. Prerequisite: Biological Sciences 1B or the equivalent. Patterns of reproduction, locomotion, foraging, and growth and development, energetics, and thermoregulation of birds. Ecological and evolutionary adaptations and allometric analysis of life history traits.

102. Fertility and Hatchability (4) II. Abbott Lecture—2 hours; discussion—1 hour; laboratory—3 hours; one independent project. Prequisite: course 100. Study of avian embryonic development and reproductive failures resulting from nutritional, genetic, and environmental problems. Use of avian embryos in research on drugs, pesticides, and other contaminants, and in biomedical research.

115. Raptor Biology (3) I. Morzenti 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.

123. Management of Birds (4) III. Millam Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Management of birds will be studied by focusing on four major avian groups: ducks, parrots, pheasants, and pigeons. Management practices will be studied in relation to differences in avian physiology and human culture.

130. Poultry Breeding and Genetics (3) I. Applanalp Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Applications of genetic principles in poultry. Action of major genes in the control of morphological, reproductive, and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

149. Advanced Poultry Management (4) III. Ernst Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or Animal Science 2, or the equivalent. Environmental management of poultry: brooding; disease prevention; recycling; lighting programs; housing design; egg, bone, and meat production; breeding flock care; and hatchery management. Offered in odd-numbered years.

150. Nutrition of Birds (3) II, III. Klaas Lecture—3 hours. Prerequisite: Physiological Sciences 101B (may be taken concurrently) or Biochemistry 101B; course 150. Comparison of digestive tracts, food habits, effects of nutrients on growth, sexual maturity, egg production, fertility and hatchability of eggs of wild and domestic species of birds. Effects of pesticides and other non-nutrient substances on their life cycles.

150L. Nutrition of Birds Laboratory (2) I, II, III. The Staff 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 (1-3) I, II, III. The Staff Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences and consent of instructor. May be repeated three times for credit. (P/NP grading only.)

192. Internship in Avian Sciences (1-2) I, II, III. The Staff (Chairperson in charge). Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Work-learning experience on and off campus in poultry, gamebirds, or exotic bird production, management and research; or in a business, industry, or agency concerned with these activities. 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 the time in class. Prerequisite: consent of instructor. Discussion of topics of current and 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). Tutoring hours and duties will vary depending on course being tutored. Prerequisite: Avian Sciences or related major; advanced standing, consent of instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of course; written critiques of teaching procedures. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Note: For key to footnote symbols, see page 133.
Avian Sciences (A Graduate Group)

Hans Abplanalp, 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 Agricultural and Environmental Sciences and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food products, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

Preparation. 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 Advisor. K.C. Klausing (Avian Sciences).

Bacteriology

See Microbiology

Biochemistry (College of Agricultural and Environmental Sciences)

The Major Program

The Biochemistry major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically-important molecules. Because the program focuses on the molecular basis of life processes, it is suitable for students interested in pursuing graduate studies or professional careers in a wide variety of contemporary biological sciences. These include basic research (e.g., biochemistry, cell biology, molecular genetics, biotechnology, human or veterinary medicine and dentistry, and biochemistry teaching). Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find biochemistry a fruitful field of study.

Choice of College

The Bachelor of Science degree is offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. Students majoring in Biochemistry 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 material 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. Further information can be obtained from the Division of Biological Sciences Office, 376 Mear Hall.

NOTE: For key to footnote symbols, see page 133.

B.S. Major Requirements:

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<td>Written/Oral Expression</td>
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<tr>
<td>College of Agricultural and Environmental Sciences students only</td>
<td>7-8</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>59-66</td>
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<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>15</td>
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<tr>
<td>Chemistry (Chemistry 1A-1B-1C, 5, or 4A-4B-4C) (students may start with Chemistry 4A and continue with 1B-1C but not vice versa)</td>
<td>15-19</td>
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<tr>
<td>Mathematics (Mathematics 16A-16B-16C or 21A-21B-21C)</td>
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<tr>
<td>Physics, 12 units minimum (Physics 6A-6B-6C or 8A-8B-8C)</td>
<td>12</td>
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<tr>
<td>Statistics (Statistics 13, 102, or 130A)</td>
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<td>Breadth/General Education</td>
<td>6-24</td>
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<tr>
<td>College of Letters and Science students: Refer to the College section for a description of the options available in meeting this requirement.</td>
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<tr>
<td>Restricted Electives</td>
<td>15</td>
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<tr>
<td>Upper division courses in biochemistry and related areas, to include at least three courses from Biochemistry 122, 133, 143, 153, and at least one additional lecture or laboratory course in a biological science other than biochemistry.</td>
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<tr>
<td>No more than 3 units of courses numbered 132, 197T, 198 or 199 may be used (check with advisor).</td>
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<tr>
<td>Unrestricted Electives to bring total to 180 units</td>
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<tr>
<td>Total Units for the Major</td>
<td>180</td>
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<tr>
<td>Major Advisor. R.L. Sprecherman (Biochemistry and Biophysics), 21B Briggs Hall.</td>
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<tr>
<td>Advising Center for the major is located in 149 Briggs (916-752-9033)</td>
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<tr>
<td>Graduate Study. See Biochemistry (A Graduate Group); and the Graduate Division section in this catalog.</td>
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<td>Courses. See under Biochemistry and Biophysics.</td>
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Biochemistry (A Graduate Group)

Harry R. Matthews, Ph.D., Chairperson of the Group
Group Office, 149 Briggs Hall (916-752-9031)

Graduate Study. The Graduate Group in Biochemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding graduate study, address the chairperson of the group.

Graduate Advisors. M.E. Dahmus (Biochemistry and Biophysics), J.C. Lagarias (Biochemistry and Biophysics), M.R. Villarazo (Biochemistry and Biophysics).

Courses in Biochemistry

Graduate Courses

Graduate Seminar (1-3) I, II. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

1. Physics 10 is optional. Students electing the Physics 8 sequence should elect Mathematics 21A-21B-21C and 21A-21B-21C.
Biochemistry and Biophysics

(College of Agricultural and Environmental Sciences)

Don M. Carlson, Ph.D., Chairperson of the Department

Department Office, 149 Briggs Hall (916-752-3611)

Faculty

Judy Callis, Ph.D., Assistant Professor
Don M. Carlson, Ph.D., Professor
Sterling Chaykin, Ph.D., Professor
Eric E. Conn, Ph.D., Professor
Richard S. Cridde, Ph.D., Professor
Michael E. Dahmus, Ph.D., Professor
Roy H. Otten, Ph.D., Professor
Martha L. Enzler, Ph.D., Professor
Charles S. Gasser, Ph.D., Assistant Professor
Jerry L. Hedrick, Ph.D., Professor
Lloyd L. Ingraham, Ph.D., Professor Emeritus
Eric B. Kricke, Ph.D., Assistant Professor
J. Clark Lagarias, Ph.D., Associate Professor
R. Marc Learned, Ph.D., Assistant Professor
Mark G. McNamee, Ph.D., Professor
Irwin H. Segel, Ph.D., Professor
Larry R. Shoemaker, Ph.D., Lecturer, S. O. E.
Paul K. Stumpf, Ph.D., Professor Emeritus
Merry R. Villaggio, Ph.D., Professor

Major Programs and Graduate Study. See the major in Biochemistry and for graduate study see Biochemistry (A Graduate Program) and the Graduate Division section in this catalog.

Related Courses. See Food Science and Technology 210, 250, 250L.

Courses in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the instructor.

Upper Division Courses

101A. General Biochemistry (3) I, II, III. Cridde, Enzler, Hilt, Kricke, McNamee, Sprecher

Lecture—3 hours. Prerequisite: Chemistry 3B or 129B. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants and microorganisms.

101B. General Biochemistry Laboratory (1) I, II, III. Carlson, Conn, Segel, Sprecher

Lecture—3 hours. Prerequisite: course 101A. Continuation of 101A.

101L. General Biochemistry Laboratory (4) I, II, III. Chaykin, Legarius, McNamee, Sprecher

Lecture—3 hours; laboratory—9 hours. Prerequisite: course 101B (may be taken concurrently); Chemistry 5. Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who need experience in the use of biochemical techniques as laboratory tools.

102L. Advanced Undergraduate Laboratory (4) III. Sprecher

Lecture—2 hours; laboratory—7 hours. Prerequisite: course 101L and consent of instructor. Advanced biochemical laboratory methods and procedures including some of the more recent technological advances. Experiments include techniques from areas such as immunochemistry, nucleic acid manipulation and sequencing, high performance liquid chromatography, and membrane biophysics.

122. Plant Biochemistry (3) I. Conn, Lagarias

Lecture—3 hours. Prerequisite: course 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

123. An Introduction to Enzymology (3) III. Whitaker

Lecture—3 hours. Prerequisite: course 101B. Principles of physical, chemical and catalytic properties of enzymes and their utilization. Experimental determination and quantitative evaluation of influence of reaction conditions on activity are stressed. Specificity and mechanisms are illustrated by consideration of selected enzymes.

122L. Enzymology Laboratory (2) III. Whitaker

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 101B, course 123 (concurrently). Laboratory procedures involved in separation and study of enzymes.

133. Behavior and Analysis of Enzyme Systems (3) III. Segel

Lecture—3 hours. Prerequisite: course 101B. Introduction to enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include steady-state kinetics, patterns of feedback biosynthesis, control by enzyme activity, allosteric enzymes, multiregulatory systems, enzyme assays, and membrane transport.

143. Structure-Function Relations of Proteins (3) I. Cridde, Hedrick

Lecture—3 hours. Prerequisite: courses 101A, 101B, and 101L (may be taken concurrently). Correlation of structure and biological function. Molecular models of enzymes that explain their physiological functioning. Physical properties used in determining protein structure. Function as measured by kinetic and binding models and as affected by physiological considerations.

153. Molecular Biology of Eukaryotic Cells (3) II. Dahmus

Lecture—3 hours. Prerequisite: course 101B and 101L. Genetics 100. Structure, expression and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription and RNA processing; protein synthesis and translational control; development, immune system and oncogenes.

190. Undergraduate Seminar in Biochemistry (1) I, II, III, The Staff

Seminar—1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical developments of modern biochemistry.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3—36 hours. Prerequisite: consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Biochemistry and Biophysics faculty. (P/NP grading only.)

194H. Biochemistry Honors (1-5) I, II, III. The Staff

Prerequisite: 4 units of course 199 with faculty director; senior standing; grade-point average of at least 3.25; consent of department. Honors project in Biochemistry. Laboratory research on a biochemical problem followed by presentation of the work in a written and oral report. (P/NP grading only.)

197T. Tutoring in Biochemistry (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion—1-5 hours. Prerequisite: upper division standing and consent of instructor. To assist the instructor by tutoring students in one of the department's regular 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)

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201A. Physical and Chemical Biochemistry (4) I. Benisek (Biological Chemistry), Criddle, Legarius, Matthews (Biological Chemistry), Segel, Troy (Biological Chemistry)

Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B/108 or 110C; 128C, 129C. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of protein molecules.

201B. Integration of Metabolism and Regulatory Phenomena (3) II. Learned

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Regulatory phenomena that occur in control of metabolism at the enzyme level; integration of metabolic pathways including homeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Offered in odd-numbered years.

201C. Molecular Biology (3) III. Bradbury (Biological Chemistry), Dahmus, Dool, Hershey (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells, and viruses.

201D. Cellular Biochemistry (3) I. Edel, McNamee, Trout (Biological Chemistry), Troy (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.

202A. Advanced Biochemical Methods (1-1) I, II, Hedrick

Lecture—1 hour. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Laboratory methods and procedures used in biochemical research.

202L. Advanced Biochemistry Laboratory (5) I, II, III. The Staff

Laboratory—15 hours. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit.

203. Carbohydrates (3) III.

Lecture—2 hours. Prerequisite: course 201B. Chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides. Offered in even-numbered years.

204. Gene Expression (3) III. Kmiec

Lecture—3 hours. Prerequisite: course 153 or 201C. Examination of current working hypotheses on the mechanism of gene expression on transcription. Transcription factors, cis-acting elements and regulatory domains will be examined in detail with a special emphasis on eukaryotic systems.

205. Biochemical Mechanisms (3) II. The Staff

Lecture—3 hours. Prerequisite: course 101B or consent of instructor. Chemistry 110C. 131. Bond structures of biochemical interest. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

206. Membrane Biochemistry (2) II. McNamee, Villaggio

Lecture—2 hours. Prerequisite: course 201D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in even-numbered years.

212. Chemical Modifications of Proteins (3) II. Benisek (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 101B; Chemistry 128C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in even-numbered years.

NOTE: For key to footnote symbols, see page 133.
Programs of Study

The Division of Biological Sciences is an intercollege unit which coordinates the teaching and research of the departments of Animal Physiology, Biochemistry and Biophysics, Genetics, Microbiology, and Zoology. Four majors leading to an A.B. degree are offered in Biological Sciences, Botany, Microbiology, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The major programs are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

The Major Programs

The major programs in Biological Sciences provide an opportunity for broader study of basic biology than is possible with most departmental majors. The programs provide suitable undergraduate 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. Students interested in a career involving considerable personal interactions, such as some of the health science areas, may be best served by the Bachelor of Arts program; for those interested in a more laboratory-oriented area, the Bachelor of Science program is more suitable.

Students majoring in Biological Sciences in the College of Letters and Science may anticipate the Day 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. These courses are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

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.

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Biological Sciences 1A-1B-1C</th>
<th>37-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics 100</td>
<td>4</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>32</td>
</tr>
</tbody>
</table>

Upper division biological sciences courses to include:

(1) a minimum of 2 units or 6 (quarter) hours of laboratory classes.

(2) at least 3 units from each of the three Area Requirement lists: animal biology, microbiology, plant biology. (See "Course List for Area Requirement" section below following the total units. The lists apply to both the A.B. and B.S. majors.)

(3) at least one course from each of the five Group Requirement lists, (a) through (e) following.

Course List for Group Requirement

(a) Organismal biology: Botany 102, 105, 106, 114, 118, 119; Entomology 101, 102, 103; Microbiology 105, 162; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 136, 137.

(b) Population biology and ecology: Anthropology 154A, Botany 117, 141; Entomology 104, Environmental Studies 100, 121; Genetics 105; Geology 150C; Microbiology 120; Wildlife and Fisheries Biology 110, 151, Zoology 125.

(c) Evolutionary biology: Anthropology 151, 152; Botany 110, 116, 140; Genetics 103; Geology 107; Plant Science 103; Zoology 148.

(d) Physiology: Botany 111, 112; Microbiology 130A-130B; Physiology 110, 117; Plant Pathology 130; Zoology 142, 143.

(e) Biochemistry and cell biology: Biochemistry 101A-101B; Botany/Zoology 130; Physiological Sciences 101A-101B; Physiology 100A-100B.

Total Units for the Major

73-78

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Biological Sciences 1A-1B-1C</th>
<th>37-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1A-1B-1C or 4A-4B-4C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 8A-8B or 12A-12B-12C</td>
<td>6-11</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C</td>
<td>9</td>
</tr>
<tr>
<td>Physics 5A-5B-5C</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
</tbody>
</table>

Recommended: Chemistry 5, a course in computer programming.

Depth Subject Matter

<table>
<thead>
<tr>
<th>Biological Sciences 1A-1B-1C</th>
<th>37-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetics 100</td>
<td>4</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>34-35</td>
</tr>
</tbody>
</table>

Upper division biological sciences courses to include:

(1) at least 2 courses from each of the three Area Requirement lists: animal biology, microbiology, plant biology.

(2) at least 3 units from each of the three Area Requirement lists: animal biology, microbiology, plant biology. (See "Course List for Area Requirement" section below following the total units. The lists apply to both the A.B. and B.S. majors.)

(3) at least one course from each of the five Group Requirement lists, (a) through (e) following.

Course List for Group Requirement

(a) Organismal biology: Botany 102, 105, 106, 114, 118, 119; Entomology 101, 102, 103; Microbiology 105, 162; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 136, 137.

(b) Population biology and ecology: Anthropology 154A, Botany 117, 141; Entomology 104, Environmental Studies 100, 121; Genetics 105; Geology 150C; Microbiology 120; Wildlife and Fisheries Biology 110, 151, Zoology 125.

(c) Evolutionary biology: Anthropology 151, 152; Botany 110, 116, 140; Genetics 103; Geology 107; Plant Science 103; Zoology 148.

(d) Physiology: Botany 111, 112; Microbiology 130A-130B; Physiology 110, 117; Plant Pathology 130; Zoology 142, 143.

(e) Biochemistry and cell biology: Biochemistry 101A-101B; Botany/Zoology 130; Physiological Sciences 101A-101B; Physiology 100A-100B.

Note: For key to footnote symbols, see page 133.

Biological Sciences
Total Units for the Major: 105-111

Breadth Subject Matter

Written/Oral Expression
See appropriate College section for requirement

Breadth/General Education
Satisfaction of General Education requirement
See also the appropriate College section for General Education requirements

Course List for Area Requirement
(a) Animal biology: Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120; Entomology 101, 102, 103, 104, 105, 106; Fish 100, 109, 113, 123, Environmental Studies 102; Geology 111A; Human Anatomy 101; Nematology 110; Wildlife and Fisheries Biology 110, 111, 120, 140, 151; Zoology 10C, 10S, 106, 10U, 122, 125, 133, 136, 137, 138, 139, 147, 148, 149, 156.
(b) Microbiology: Botany 114, 118, 119; Entomology 156; Geology 111B; Medical Microbiology 107; Microbiology—all upper division courses (excluding 190-199 courses); Plant Pathology 120; Veterinary Microbiology 127, 128, 132.
(c) Plant Biology: Botany 100, 101, 102, 105, 106, 111, 112, 114, 116, 117, 118, 119, 121, 122, 140, 141; Environmental Horticulture 105, 107; Plant Sciences 101, 103; Range Science 100; Vegetable Crops 105.
Note: Botany 114, 118, or 119 may be used for either microbiology or plant biology (not both).

Other Upper Division Courses
A list of courses which will be accepted in satisfaction of the upper division major requirement, if petitioned, is available in the Division of Biological Sciences Office.

Major Advisers. Contact Division Office for adviser assignments.

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 demonstrates scholarship and accomplishment in course 194H. The Division of Biological Sciences also confirms Citations of Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a Citation must first meet or exceed a specified grade-point average and participate in an appropriate research project. The Division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High Honors at graduation. For further details on the above programs and awards, contact the Division Office.

Minor Program Requirements:
The minor in Biological Sciences is designed to accommodate students with the range and variety of modern biology, including work in two of three areas: animal biology, plant biology, and/or microbiology, and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and/or biochemistry and cell biology. The list of required courses is restricted to those which are acceptable for the major program in Biological Science. Courses in the minor which do not require extensive upper division preparatory work; substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on certification of completion of the minor program can be obtained from the Division Office.

UNITS
Biological Sciences: 22
Genetics 100: introduction to genetics
Additional upper division units (see Area and Group Requirements below): 18
Area Requirements:
1. Courses in two of these areas: Animal Biology, Microbiology, and/or Plant Biology.
2. An extensive list of courses which will satisfy area requirements can be found under the Biological Sciences major program description above.
3. Courses can be used to simultaneously satisfy both the area and group requirements.

Group Requirements:
at least one course or course sequence must be selected and laboratory instruction in the development of biological knowledge and the principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Diseases and their control are emphasized in biology. Not open for credit to those who have had course 1A. General Education credit: Nature and Environment/Introductory.

11A-B. Issues in the Life Sciences (2-2.5) II, VI.
Lecture—lecture; discussion—lecture. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students’ understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.

11B. History of Cancer (3) III. Pfeiffer (Biological Sciences, Microbiology)
Lecture—lecture. Prerequisite: course 1A or 10, or Genetics 10, or Physiology 10. Interdisciplinary course that offers an integrated study of the historical, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in even-numbered years.

98. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses
115. Problems in Advanced Biology (15) III.
Full-time study at Bodega Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration, i.e., appropriate laboratory courses in invertebrate zoology (normally Zoology 112-112L), microbiology (normally Microbiology 105 or 120), paleontology, geology, or botany; junior standing. Lecture, laboratory and field work, and directed study of a selected focal topic in marine biology, stressing experience in original research. Offered depending upon availability of instructors. Limited enrollment.

120. Developmental Biology of Marine Invertebrates (4) II. Clark and Cheng (Biological Sciences)
Lecture—lecture. Prerequisite: Zoology 100-100L, Biochemistry 101-101L, Physiology 101-101L, or Biological Sciences 101-101L course 123 concurrently. Phylogenetic patterns of reproduction and development among the marine invertebrates. Emphasis on both modern and classical approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

120P. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (4) II. Clark and Cheng (Biological Sciences)
Lecture—lecture. 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.)

121. Physiological Adaptation of Marine Organisms to Changing Climates (4) III.
Lecture—lecture. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B. Lecture—lecture. Prerequisite: course 123 concurrently. Physiological adaptation to the environment among organisms in marine and estuarine
Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group (916-752-1135 or 752-2504)
Group Office, 3078 Bainer Hall (Chemical Engineering), (916-752-2504/0400)

Faculty
Includes faculty members from the three colleges, and the Schools of Veterinary and Human Medicine. Those listed below are members of the Group Executive Committee and serve as faculty advisors.

Fitz-Roy E. Curry, Ph.D., Professor (Human Physiology)
Mont Hubbard, Ph.D., Professor (Mechanical Engineering)
Maury L. Hull, Ph.D., Associate Professor (Mechanical Engineering)
David Katz, Ph.D., Professor (Obstetrics and Gynecology, Chemical Engineering)
R. Bruce Martin, M.D. Professor in Residence (Orthopaedic Surgery)
James F. Shackelford, Ph.D., Professor (Materials Sciences and Engineering)
Keith R. Williams, Ph.D., Assistant Professor (Physical Education)

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 and development of devices and procedures useful for human and veterinary medicine. It is a broad interdisciplinary program which is best suited for students who are capable and committed to work as independent professionals. 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 applications. Some such training can in principle be acquired after admission to the Group, but it generally necessitates one or more additional years of study.

Related Courses. Agricultural Economics 112; Biochemistry and Biophysics 215; Engineering: Chemical 102A, 102B, 253A, 253B, 263; Engineering: Civil 244; Engineering: Computer Science 30, 40, 168; Engineering: Electrical and Computer Science 161, 172, 176, 177; Engineering: Materials Science 140, 142, 144; Engineering: Mechanical 171, 172, 176, 222, 276B, 276B; English 104; Human Physiology: 200, 260, 261, 265; Infectious Diseases 250; Mathematics 128A, 128B, 128C; Physical Education 101, 115, 220, 226; Physiological Sciences 260; Psychology 112, 113, 120B, 242; Rhetoric and Communication 51; Statistics 131B, 131C, 233; Zoology 106, 202, 203, 236, 241.

Graduate Courses
230. 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 Biomaterials (4) I. Shackelford. Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials.

Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group (916-752-7466)

Faculty
Includes faculty members from the Departments of Biochemistry and Biophysics, Chemistry, Physics, Zoology, 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 adviser, and a group member. The Committee meets to consider individual educational needs with the student.

Graduate Adviser. A.H. Maiz (Chemistry).

Graduate Courses
200. Current Techniques in Biophysics (3) III. M. McNamee. Lecture—2 hours. Prerequisite: graduate standing; Biochemistry 101A, Zoology 121A or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (S/U grading only.)
200L. Biophysics Laboratory (3) I, II, III. The Staff (Chairperson in charge).
Laboratory—15 hours (5 weeks). Prerequisite: course 200 (may be taken concurrently). Laboratory assignment in the research laboratory of a Biophysicist Graduate Group faculty member. Individual research problems with emphasis on methodology, experimental expertise, and experimental design.
200B. Biophysics Laboratory (5) I, II, III. The Staff (Chairperson in charge).

Biophysical Techniques in Biomechanics (3) II. Williams. Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; Physical Education 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional gait, body reaction and angular body segment parameter determination; electromyography; biomechanical modeling. (Same as Physical Education 227.)

202. Advanced Information Systems (3) II. Waiers. Lecture—2 hours; laboratory—2 hours. Prerequisite: experience in initial phases of data preparation, editing and sorting; Computer Science Engineering 168 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, computer networks, and the role of people in the development and application of information systems.
208. Seminar (1) I, II, III. Katz Seminar—1 hour Seminar in biomedical engineering. (S/U grading only.)
200. Group Study (1-5) I, II, III. The Staff.
209. Research (1-12) I, II, III, IV. The Staff (S/U grading only.)

NOTE: For key to footnote symbols, see page 132.
Botany—two 18-hour rotations (5 weeks each). Prerequisite: course 200 (may be taken concurrently).
Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodologies/procedural experience and experimental design.

290C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Biophysics and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated with consent of instructor. (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.)

Botany (College of Letters and Sciences)
Terence M. Murphy, Ph.D., Chairperson of the Department
Department Office, 143 Robbins Hall (916-752-0617)

Faculty
Frederick T. Addicott, Ph.D., Professor Emeritus
Lars Anderson, Ph.D., Lecturer
Floyd M. Ashbey, Ph.D., Professor Emeritus
Daniel A. Axelrod, Ph.D., Professor Emeritus
Michael G. Barbour, Ph.D., Professor
David E. Bayer, Ph.D., Professor
Bruce A. Bonner, Ph.D., Associate Professor
Paul A. Castelfranco, Ph.D., Professor
Herbert B. Currier, Ph.D., Professor Emeritus
James A. Doyle, Ph.D., Professor (Botany, Geography)
Clyde Elmore, Ph.D., Lecturer
Emmanuel Epstein, Ph.D., Professor Emeritus (Botany, Land, Air and Water Resources)
Richard H. Fink, Ph.D., Professor
Ernest M. Gillford, Jr., Ph.D., Professor Emeritus
John H. Harada, Ph.D., Assistant Professor
Hendrik J. Ketelhatter, Ph.D., Professor
Donald W. Kihyo, Ph.D., Professor
Norma J. Lang, Ph.D., Lecturer
William J. Lucas, Ph.D., Professor
Jack Major, Ph.D., Professor Emeritus
W.B. John Murchie, Ph.D., Professor Emeritus
Larry Millich, Ph.D., Lecturer
Terence M. Murphy, Ph.D., Professor
Robert F. Norris, Ph.D., Associate Professor
William O'Neill, Ph.D., Assistant Professor
Robert W. Peirce, Ph.D., Professor
Marcel Rijmenek, Ph.D., Associate Professor
Thomas L. Rost, Ph.D., Professor
Maureen L. Starnes, Ph.D., Associate Professor
Alan J. Sterner, Ph.D., Professor
Carl R. Stocking, Ph.D., Professor Emeritus
Steven M. Theg, Ph.D., Assistant Professor
Robert M. Thornton, Ph.D., Senior Lecturer
John H. Tucker, Ph.D., Professor Emeritus
Larry Vanderhoof, Ph.D., Professor
Grady L. Webster, Ph.D., Professor
T. Elliott Weir, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor

The Major Programs
Study leading to the Bachelor of Arts or Bachelor of Science degrees in botany involves several basic sciences, including mathematics, chemistry, physics, biochemistry, and genetics, as well as in-depth coursework in several specialized areas of plant biology: anatomy, cell and molecular biology, morphology, systematics and plant evolution, physiology, ecology, mycology, and weed science.

Botanists 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 botanists will have careers in the pharmaceutical, petroleum or chemical industries, seed companies, botanical gardens, plant nurseries or food companies. The rapidly-developing field of plant biotechnology will offer challenging careers to botanically trained graduates, and many elect to continue study toward advanced degrees.

Students majoring in Botany 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 in 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 material as upper division courses in the subject at UC Davis.

Choice of College. The Bachelor of Arts degree is offered only in the College of Letters and Science and should be selected by those interested in a less intensive program in science, but one which permits a basic introduction to plant biology. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences and should be selected by those wishing a greater background in the fundamental sciences and in botany.

There are two academic plans offered within the B.S. program.

Graduate Study. The Department is a nationally recognized center for research and graduate study in many areas of plant biology, including ecology and systematics, cell and developmental botany, and biophysics of plant functions. It is also a center for the study of weed science (weed biology, weed control, and herbicide physiology). Graduate students study outside the faculty in the Department under the auspices of the following Graduate Groups: Botany, Plant Physiology, Genetics, Cell and Developmental Biology, Biochemistry, Biophysics, Ecology, and Microbiology.

Refer to specific graduate groups in this section of the catalog.

A.B. Major Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 8A, 8B</td>
<td>16</td>
</tr>
<tr>
<td>Zoology 2-1L, or Microbiology 2 or 102, 2C, or Geology 4-4L</td>
<td>4-6</td>
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</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botany 102, 108, 105, 111, 112, 114, 116</td>
<td>40</td>
</tr>
<tr>
<td>Genetics</td>
<td>39</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional upper division units in Botany or related natural science courses</td>
<td>8-9</td>
</tr>
</tbody>
</table>

Total Units for the Major | 80-83 |

Recommended Botany 100, 118, 119, Chemistry 1C.

For students with interests in specialized areas of botany (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major adviser.

B.S. Major Requirements:

Option I: For those who plan (a) advanced study in some areas of botany or a related discipline, (b) to obtain a general secondary teaching credential, or (c) training for a position requiring a detailed knowledge of plants.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Physics 6A, 6B, 6C</td>
<td>12</td>
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<tr>
<td>Mathematics 16A, 16B</td>
<td>6</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Biochemistry 101A, 101B</td>
<td>47</td>
</tr>
<tr>
<td>Genetics</td>
<td>100</td>
</tr>
<tr>
<td>Botany 105, 108, 111, 111L, 12, 116, 117, 118, 119</td>
<td>37</td>
</tr>
</tbody>
</table>

Total Units for the Major | 105-110 |

Recommended Botany 199 (3-5 units); German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major adviser.

Option II: For those who plan advanced study in physiology and/or biochemistry of plants.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>Botany 199 (3-5 units); German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major adviser.</td>
<td></td>
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Preparatory Subject Matter | 56-68 |
| Biological Sciences | 5 |
| Botany 2 | 5 |
| Chemistry 1A-1B-1C-5 or 4A-4B-4C | 15-19 |
| Chemistry 8A-BB or 128A-128BB-128C | 123 |
| Mathematics 16A-16B-16C or 21A-21B-21C | 9-12 |
| Physics 6A-6B-6C or 8A-8B-8C | 12 |
| Statistics | 13 or 102 | 4 |

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Biochemistry 101A, 101B, 102B, 102L, 122</td>
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</tr>
<tr>
<td>Botany 105, 111, 111L, 112</td>
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<tr>
<td>Genetics</td>
<td>100</td>
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<tr>
<td>Chemistry 107A, 107B</td>
<td>6</td>
</tr>
<tr>
<td>One course each in three of the following four areas:</td>
<td>12-15</td>
</tr>
<tr>
<td>(a) Taxonomy and evolution: Botany 102, 108</td>
<td></td>
</tr>
<tr>
<td>(b) Morphology and cytology: Botany 116, 130, 140</td>
<td></td>
</tr>
<tr>
<td>(c) Physiology and mycology: Botany 114, 118, 119</td>
<td></td>
</tr>
<tr>
<td>(d) Ecology: Botany 117</td>
<td></td>
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<tr>
<td>Total Units for the Major</td>
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</table>

Recommended Botany 195 (5-5 units); German, French, or Russian; Engineering 5 or Computer Science Engineering 30. Certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major adviser.

Breath Subject Matter

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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<tr>
<td>College of Agricultural and Environmental Sciences</td>
<td>24</td>
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<tr>
<td>English and/or rhetoric</td>
<td>8</td>
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<tr>
<td>Social sciences and/or humanities</td>
<td>16</td>
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</table>

See also the College section for additional requirements.

College of Letters and Sciences students: Refer to the College section for a description of requirements to be completed in addition to the major.

Minor Adviser: J.J. Harada.

Minor Program Requirements:
Botany 169

141. Zoology 149

102. Evolutionary Biology of Plants (4) II. Stanton, Kyhos, Doyle Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to evolutionary principles and processes, emphasizing plants. Topics include: mutation, selection, gene flow, chromosome evolution, speciation, adaptive radiations, recombination of evolutionary relationships, evolutionary rates and trends, and origin of new groups.

101. Survey of Plant Communities of California (3) III. Barbour Lecture—2 hours; weekend field trips—4 to 8 days. Prerequisite: Biological Sciences 1C and course 10 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/Non-Introductory. Recommended GE preparation: Botany 10.

102. California Flora (5) III. Webster 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 various 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.

106. Plant Cell, Tissue and Organ Development (3) II. Rost Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Current concepts of the development of plant cells, tissues, and organs. Emphasis will be on structural aspects. Offered in odd-numbered years.

108. Systematic Botany of Flowering Plants (5) III. The Staff Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Laboratory and field study of the family 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. Stermer, Lucas Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C; Chemistry 88 (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.

111D. Problems in Plant Physiology (1) I. Lucas, Stermer Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. (P/NP grading only.)

111L. Introductory Plant Physiology Laboratory (3) III. Bonner Discussion—1 hour; laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently). Introduction to practical experimental techniques and instrumental usage of natural plant physiological processes such as water-solute absorption and their movement and utilization; translocation; transpiration; photosynthesis; respiration; growth; development.

112. Plant Growth and Development (3) II. Thornton Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 88; course 111 and Biochemistry 101A recommended. Processes, dynamics, and control of growth and development. Metabolism.

122. Problems in Plant Growth and Development (1) I. 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.)

114. Fungi, Algæ, and Bryophytes (5) III. Wells, Lang Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to the morphology, taxonomy, evolution, and physiology of the fungi, algae, liverworts, and mosses. Not open for credit to students who have completed course 118 or 119.

115. Marine Botany (10) Extra-session summer. Lecture—10 hours, laboratory—20 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Full-time study at the Bodega Marine Laboratory. Includes lectures, laboratories, and field work with emphasis on the morphology, identification, and natural history of the marine algae.

116. Morphology and Evolution of Vascular Plants (4) II. Giftord Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to form, structure, and evolutionary history of selected plants from major divisions; emphasis on living and seed-producing plants and their possible relationships to plants of past eras; structure-function relationships and adaptations to changing environments.

117. Plant Ecology (4) I. Stanton, Reimanek, Peary Lecture—3 hours; three to five field trips (Friday or weekend). Prerequisite: Biological Sciences 1A, 1B, 1C; course 111D and course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for course 101.

118. Physiology (5) I. Lang Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Comparative morphology, physiology and development of major divisions of vascular plants with emphasis on phylogeny in Chlorophyta; laboratory exercises stress identification and culturing. Environmental significance and exploitation of fresh-water and marine forms 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, origin, and taxonomy of selected species of the major divisions of the fungi.

120. Introduction to Weed Science (3) III. Bayer Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Chemistry 88, 89. 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. Site identification of common weeds and demonstrations to illustrate the principles.

121. Biology of Weeds (3) III. The Staff 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. Laboratory work 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 of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils.

125. Molecular Biology of Plant Development (3) III. Myers Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biochemistry 101B; Genetics 102A or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues.

130. Survey of Cell Biology (4) I. Leslie (Zoology); II. Falk, Thog Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 88 or 129C; or Biochemistry 101B; or Chemistry 108 strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include energy metabolism, motility, gene expression, and membranes. Currently popular methodologies used in cell biology will be presented in a discussion section. Not open to students who have credit in Zoology 121A, 121B. (Same course as Zoology 130.)

NOTE: For key to footnote symbols, see page 130.
Graduate Courses

202. Plant Ecophysiology (3) I. Peary
Lecture—3 hours. Prerequisite: courses 111, 112, 117, and consent of instructor. Study of the mechanisms of physiological adaptation of plants to their environment.

203. Ecophysiological Methods (3) I. Peary
Lecture—1 hour; laboratory—4 hours. Prerequisite: courses 111, 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methods and instrumentation used in plant ecophysiology.

205A. Advanced Plant Physiology (3) I. Lucas
Lecture—3 hours. Prerequisite: course 112; Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, translocation and membrane transport.

205B. Advanced Plant Physiology (3) I. Castelfranco
Lecture—3 hours. Prerequisite: course 112; Biochemistry 101B. Photosynthesis, respiration, and general plant metabolism.

205C. Advanced Plant Physiology (3) I. Bonner
Lecture—3 hours. Prerequisite: course 112; Biochemistry 101A courses 205A, 205B and Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development.

206A. Advanced Plant Physiology Laboratory (3) I. Lucas
Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments demonstrate the theory and practice of modern instrumentation, and are designed to illustrate subject matter of course 205A.

206B. Advanced Plant Physiology Laboratory (3) I. Castelfranco
Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

206C. Advanced Plant Physiology Laboratory (3) I. The Staff
Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

212. Physiology of Herbicidal Action (3) I. Beyer
Lecture—3 hours. Prerequisite: courses 112, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants.

215. Light and Plant Growth (3) I. Bonner
Lecture—3 hours. Prerequisites: courses 205A, 205B, 205C, Physics 1B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Course offered in even-numbered years.

221. Special Topics in Plant Physiology (2) I. 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.)

222. Special Topics in Plant Morphology, Systematics, and Ecology (2) I. Doyle, Webster
Seminar—2 hours. Survey of recent advances in plant structure and evolution. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated for credit. (SU grading only.) Offered in even-numbered years.

227. Plant Molecular Biology (4) III. Harada
Lecture-discussion—4 hours. Prerequisite: Biological Sciences 1A, 1B, 1C and Genetics 102A-102B, or Biochemistry 102A-102B. Introduction to the molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli.

228. Plant Molecular Biology Laboratory (4) III. Harada, Bennett (Vegetable Crops)
Lecture—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101A, a course in molecular genetics and consent of instructor. Course 227 recommended. 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.)

231. Biological Electron Microscopy (1) I. Falk
Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological electron microscopy. Areas covered are: electron optics, electron specimen intersections, and vacuum systems.

231L. Biological Electron Microscopy Laboratory (3) I. Falk
Laboratory—9 hours. Prerequisite: consent of instructor; course 231 (may be taken concurrently). Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

240. Paleobotany and Angiosperm Evolution (4) I. Doyle
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 108, 116, or 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angiosperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in even-numbered years.

243. Palynology (4) I. Doyle
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108, 116, or 140. Morphology of spores and pollen grains and their use in stratigraphic, palynological, and paleontological studies. Techniques for study of modern spores and pollen and identification of fossil palynomorphs from sediments of Paleozoic to Quaternary age. Offered in odd-numbered years.

255. Principles of Plant Taxonomy (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108; Genetics 103 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—anatomy, embryology, biochemistry, etc.—contribute problems of taxonomic relationships, mainly of genera and higher categories.

256A. Experimental Plant Taxonomy (2) II. Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 102; course 117 and Genetics 103 recommended. Application of taxonomic techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in odd-numbered years.

256B. Experimental Plant Taxonomy (2) III. Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Continuation of course 256A. Study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytotaxonomy, transplants, studies, etc., to the solution of taxonomic problems and the clarification of relationships. Offered in odd-numbered years.

260. Seminar (1) I. Ketellepp, II. Vanderhoff
Seminar—1 hour. (SU grading only.)

260C. Research Conference in Botany (1) I, II, III, I. The Staff
Discussion—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (SU grading only.)

291. Seminars in Botany (1) I. O'Neil
Seminar—1 hour. Review of current literature in botanical disciplines. Course topics to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (SU grading only.)

NOTE: For key to footnote symbols, see page 133.
Botany (A Graduate Group)

Students admitted into the Botany Graduate Group before June 10, 1989 will be allowed to complete their degree in this subject.

New students, however, should see the Plant Biology Graduate Group section in this catalog.

Information. 152 Roberts (916-752-7094).

Cantonese

See Asian American Studies

Cell and Developmental Biology

(A Graduate Group)

David W. Dearmer, Ph.D., Chairperson of the Group

(916-752-2175)

Group Office, 2320 Storer Hall (916-752-7468)

Faculty. The group includes 34 faculty members from fourteen 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 interdisciplinary 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 choice of major core courses will reflect the student's primary research interest.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science.

Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics and biology.

Graduate Advisers. C. A. Erickson (Zoology), S. Mezzel (Human Anatomy).

Courses in Cell and Developmental Biology

Graduate Courses

200. Current Techniques in Cell Biology (2) I. Nucelleti
Lecture—2 hours. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunocytochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (SU grading only.) (Same course as Zoology 200.)

200A. Cell and Developmental Biology Laboratory (3) I, II. The Staff (Chairperson in charge)-Laboratory—18 hours (one five-week assignment). Prerequisite: course 200 (may be taken concurrently). Assignment in research laboratory of a Cell and Developmental Biology graduate student group members. Individual research problems with emphasis on methodologies/procedural experience and experimental design. (Same course as Zoology 200A.)

200B. Cell and Developmental Biology Laboratory (6) I, II. The Staff (Chairperson in charge)-Laboratory—18 hours (two five-week assignments). Prerequisite: course 200 (may be taken concurrently). Assignments in research laboratories of Cell and Developmental Biology graduate group members. Individual research problems with emphasis on methodologies/procedural experience and experimental design. May be repeated for credit. (Same course as Zoology 200B.)

205. Cell Biology of the Cytoskeleton (2) I. Tabin, Aggeler
Lecture—1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins: actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (SU grading only) Even-numbered years only.

290. Current Topics in Cell and Developmental Biology (1) I, II. 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.)

290C. Research Conference in Cell and Developmental Biology (1) I, II. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 290 concurrently. Presentation and discussion of faculty and graduate student research in cell and developmental biology. 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.)

NOTE: For key to footnote symbols, see page 133.

Chemistry

(Chemistry of Letters and Science)

Kevin M. Smith, Ph.D., Chairperson of the Department

Ph.D., Vice-Chairperson of the Department

Department Office, 108 Chemistry Building (916-752-0933; FAX 916-752-5995)

Faculty

5 Thomas L. Allen, Ph.D., Professor
Lawrence J. Andrews, Ph.D., Professor Emeritus
Alan L. Baich, Ph.D., Professor
Albert T. Bollin, Ph.D., Professor
Robert K. Britton, Ph.D., Professor Emeritus
R. David Britt, Ph.D., Assistant Professor
Joyce F. Dri, Ph.D., Associate Adjunct Professor
Timothy C. Donnelly, Ph.D., Lecturer
2 W. Ronald Fawcett, Ph.D., Professor
William H. Fink, Ph.D., Professor
Edwin C. Friedrich, Ph.D., Professor
Sevi S. Friedrich, Ph.D., Lecturer
Hakon Hope, Cand. real., Professor
William M. Jackson, Ph.D., Professor
Susan M. Kazurlaich, Ph.D., Assistant Professor
Raymond M. Keeler, Ph.D., Professor Emeritus
Joel E. Kezer, Ph.D., Professor
Peter B. Kelly, Ph.D., Assistant Professor
Richard E. Kepner, Ph.D., Professor Emeritus
Mark J. Kuth, Ph.D., Professor
Gerd N. LaMar, Ph.D., Professor
Carlito B. Leblonde, Ph.D., Assistant Professor
August H. Makl, Ph.D., Professor
Donald A. McQuarrie, Ph.D., Professor
Claude F. Meares, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Tadeusz F. Molinski, Ph.D., Assistant Professor
W. Kenneth Mueller, Ph.D., Professor
Krishnan P. Nambar, Ph.D., Assistant Professor
Michael H. Nantzi, Ph.D., Assistant Professor
Charles P. Nash, Ph.D., Professor
Edgar P. Painter, Ph.D., Professor Emeritus
Philip P. Power, Ph.D., Professor
Peter A. Rock, Ph.D., Professor
Carl W. Schmid, Ph.D., Professor
Neil E. Schore, Ph.D., Professor
Kevin M. Smith, Ph.D., Professor
Leo H. Sonmer, Ph.D., Professor Emeritus
James H. Swinhart, Ph.D., Professor
Dino S. Tint, Ph.D., Professor
Nancy S. True, Ph.D., Professor
David H. Wolman, Ph.D., Professor Emeritus
Fred E. Wood, Ph.D., Lecturer
George S. Zweifel, Sc.D., Professor

The Major Programs

The goal of a bachelor's program in chemistry is to give a broad introduction to the principles of the field and provide enough of the factual knowledge so that the student may quickly learn the specific chemistry applicable to the field in which the student chooses to work. 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 select 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. Students who plan to pursue graduate work in chemistry or related fields are strongly advised to obtain a leading knowledge of German or Russian. High school students should note that the preparation for either the A.B. or the B.S. degree is simplified if their high school programs include chemistry and four years of mathematics. Degree candidates in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.
Career Alternatives. Chemistry graduates with bachelor’s degrees are employed extensively throughout industry in production supervision, quality control, technical sales, 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 pulp processing, the chemical industry, pharmaceuticals, and the photographic industry. An advanced degree is usually required for a career in research or education.

### A.B. Major Requirements:

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<th>Preparatory Subject Matter</th>
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<td>Chemistry 1A-1B-1C-5</td>
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<td>Physics 5A-5B-5C</td>
<td>12</td>
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<tr>
<td>Mathematics 11C or 11E-16B-16C</td>
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<tr>
<th>Depth Subject Matter</th>
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<tr>
<td>At least 11 upper division units in chemistry (except Chemistry 107A or 107B), biochemistry, or physics</td>
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**Total Units for the Major:** 72-79

### B.S. Major Requirements:

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<tr>
<td>Physics 9A, 9B, 9C, 9D</td>
<td>16</td>
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<tr>
<td>Mathematics 21A, 21B, 21C, 22B, 22A or 22C</td>
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<table>
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<tr>
<th>Depth Subject Matter</th>
<th>UNITS</th>
</tr>
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<tbody>
<tr>
<td>At least 9 additional upper division units in chemistry (except Chemistry 107A or 107B), including one course with laboratory work</td>
<td>9</td>
</tr>
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</table>

**Total Units for the Major:** 96-100

### Major Advisers.


### Honors and Honors Program.

The student must take a minimum of 6 units of course 194H spread out over a minimum of two quarters with a comprehensive written report of the project submitted at the end of the second quarter.

### Graduate Study.

The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Division section in this catalog.

### Courses in Chemistry

#### Lower Division Courses

1. **General Chemistry** (3) I. Jackson, Rock, Wood; II. Lamar, McQuarrie, Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry and physics and good facility in algebra and geometry including logarithms and exponents recommended. Fundamental principles of chemistry. Chemical reactions and equations, periodic table, stoichiometry, gases, thermodynamics, atomic and molecular structure. General Education Credit for non-GE course sequence (1A-1B-1C-5) which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

2. **General Chemistry** (5) II. Donnelly, Rock; III. Wood, Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1A or 4A. Continuation of course 1A. Liquids, colloidal properties of solutions, chemical equilibria, acids and bases, oxidation-reduction reactions, thermodynamics, electrochemistry, introduction to qualitative analysis. General Education Credit for non-GE course sequence (1A-1B-1C-5) which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

3. **Chemistry** (5) I. Kauflarich, Britt, Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2B or permission of instructor. Application of principles of chemistry to qualitative analysis. General Education Credit for non-GE course sequence (1A-1B-1C-5) which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

4. **General Chemistry** (5) I. Tinti, Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently): high school chemistry and physics. Stoichiometry, the periodic table, chemical reactions and equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Intended for students majoring in the physical sciences or engineering. Course sequence 4A-4B-4C is equivalent to sequence 1A-1B-1C-5.

5. **General Chemistry** (5) II. Wood, Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A. Continuation of course 1A. Chemical thermodynamics; the properties of liquids and solutions; quantitative treatment of chemical equilibrium with applications to precipitation reactions; acid-base reactions, and oxidation-reduction reactions, elementary electrochemistry. Laboratory will emphasize quantitative wet-chemical techniques.

6. **General Chemistry** (5) III. Nash, Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B. Continuation of course 2B. Chemical kinetics, topics in systematic inorganic chemistry, the solid state, nuclear chemistry, introduction to organic chemistry and biochemistry. Laboratory will emphasize qualitative analysis and preparative techniques.

7. **Quantitative Analysis** (4) I, II, III. Donnelly, 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-4C sequence may enroll in course 5 for 2 units only; not open to students who have received credit for 4A-4B-4C.

8. **Organic Chemistry** Brief Course (3) I, II, III. S. Friedrich, I. Bottini, Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. An introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

9. **Organic Chemistry** Brief Course (3) I. Doi, II. Musil, III. Wood, Lecture—2 hours; laboratory—3 hours. Prerequisite: course BA. Continuation of course BA. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds.

10. **Concepts of Chemistry** (4) I. Swinheart, Lecture—4 hours. A survey of basic concepts and contemporary approaches in 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 1A credit. General Education Credit: Nature and Environment/Introductory.

11. **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)

12. **Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

### Upper Division Courses

107A. **Physical Chemistry for the Life Sciences** (3) I. Fink, Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor. Mathematics 160C or 21C, one year college level physics. A basic course in physical chemistry intended for majors in the life science areas. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of nonelectrolytes. Kinetic theory of gases and liquids. Transport processes in liquids and solutions.

107B. **Physical Chemistry for the Life Sciences** (3) II. Fink, Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrodynamics and the thermodynamics of simple electrolyte solutions. Chemical rate processes. Introduction to spectroscopy, atomic and molecular structure, X-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloid systems. Considerations on bioinorganic processes.

108. **Physical Chemistry of Macromolecules** (3) I. Meares, Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon 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 polymer systems.

110A. **Physical Chemistry: Thermodynamics** (3) I. Nash, Hope; III. Kelly, Lecture—3 hours. Prerequisite: course 5 or 4C; Mathematics 21C or 16C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. **Physical Chemistry: Quantum Mechanics** (3) I. McQuarrie; II. Fink, Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. **Physical Chemistry: Kinetics** (3) I. Jackson, III. Kelzer, Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

111. **Physical Chemistry: Methods and Applications** (4) I. Mak, III. Tinti, 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) I. Lebrilla, Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107A. Theory and practice of modern instrumental techniques of chemical analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples having practical significance.

120. **Physical Chemistry Laboratory: Advanced Methods** (3) II. Hope, Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110C and 111. Design of experiments, experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments.

121. **Introduction to Molecular Structure and Spectra** (4) I. True, Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

124A. **Inorganic Chemistry: Fundamentals** (3) I. Powell, Lecture—3 hours. Prerequisite: course 1C or 4C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules

**NOTE:** For key to footnote symbols, see page 133.
and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds.

124A. Inorganic Chemistry: Main Group Elements (3) II. Swinehart
Lecture—3 hours. Prerequisite: course 124A. Synthesis, reactions, and reactivity of main group heteroatomic molecules containing the main group elements.

124C. Inorganic Chemistry: d and f Block Elements (3) III. Balch
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the organolanthanides and actinides.

128A. Organic Chemistry (3) I. Muskar; II. Scrore; III. Molinski
Lecture—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; chemistry majors should enroll in course 128A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Only two units credit allowed students having had course 8B.

128B. Organic Chemistry (3) I. Zwiefel; II. Nambiar
Lecture—3 hours. Prerequisite: course 128A or consent of instructor; course 128A strongly recommended; chemistry majors should enroll in course 128B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

128C. Organic Chemistry (3) I. Nantz; II. E. Friedrich; III. Zwiefel
Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.

129A. Organic Chemistry Laboratory (2) I, III. S. Friedrich; II. B. Bontini; III. N. Labor
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; 128A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds.

129B. Organic Chemistry Laboratory (2) I, III. The Staff
Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 128B and 129A concurrently and 129B. Continuation of course 129B.

130. Qualitative Organic Chemistry (4) III. E. Friedrich
Lecture—1 hour; laboratory—9 hours. Prerequisites: courses 5, 128C, 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

131. Modern Methods of Organic Synthesis (3) II. Zwiefel
Lecture—3 hours. Prerequisite: course 128C. Introduction to modern synthetic methodology in organic chemistry with emphasis on stereoselective reactions and application to multistep syntheses of organic molecules containing multifunctionality.

140. Synthetic Methods (4) III. Power
Lecture—1 hour; laboratory—9 hours. Prerequisites: course 128C, 129C. Integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a variety of methods.

150. Chemistry of Natural Products (3) I. Molski
Lecture—3 hours. Prerequisite: course 128C. Chemistry of terpenes, steroids, acetylgenins, and alkaloids; isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

192. Internship in Chemistry (1-6), II, III. The Staff (Chairperson in charge)
Internship—3 hours. Prerequisite: open division standing; project approval by faculty sponsor prior to enrollment. Supervised work-learning experience in chemistry; requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only)

194H. Undergraduate Research (2-3) I, II, III. The Staff (Chairperson in charge)
Prerequisite: course 1C (may be taken concurrently) and honors standing. Research and a written report of the investigation. Unit value to be determined by instructor supervising the research. (P/NP grading only)

195. Industrial Chemistry (1) I. Wood
Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only)

197. Projects in Chemical Education (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory demonstrations, preparation of materials for auto-tutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only)

199. Special Topics in Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only)

Graduate Courses
201. Basic Chemical Uses of Symmetry and Group Theory (2) I. Kauzlarich
Lecture—2 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point group, molecular symmetry. Representations of groups. Applications to molecular orbitals and molecular vibrations.

205. Symmetry, Spectroscopy, and Structure (3) II. Kelly
Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3) II. Tinti
Lecture—3 hours. Prerequisite: courses 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, variational theory, variational atoms and molecules.

212B. Quantum Chemistry: Time-Dependent Systems (3) III. Fink

212C. Quantum Chemistry: Molecular Spectroscopy (3) I. Tye
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. Brett
Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ergodic theory, statistical mechanics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium.

211B. Statistical Mechanics (3) III. Kelzer, McQuarrie
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, Brownian motion and linear response theory. Offered in odd-numbered years.

212. Chemical Dynamics (3) II. Jackson
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 even-numbered years.

215. Theoretical and Computational Chemistry (3) III. Kelzer, McQuarrie, Fink
Lecture—3 hours. Prerequisites: courses 211A and 211B. The use of computer methods for the study of many-body systems; the use of computer programs for the solution of problems in computational chemistry.

216. Magnetic Resonance Spectroscopy (3) II. Maki, LaMar
Lecture—3 hours. Prerequisites: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of g-tensors and organic and transition metal compounds. Spin Hamiltonians, nuclear quadrupole resonance. Spin relaxation processes. Offered in odd-numbered years.

217. X-Ray Structure Determination (3) II. Hope
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, x-ray 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. The Staff
Lecture—3 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical-chemical determination of macromolecular structure. Offered in even-numbered years.

219. Spectroscopy of Organic Compounds (3) I. B. Friedrich
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanisms phenomena using spectroscopic methods—primarily 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, and in general will emphasize the research interests of the staff member giving the course.

226. Principles of Transition Metal Chemistry (3) III. Balch
Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

227A-F. Special Topics in Inorganic Chemistry (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special topics

NOTE: For key to footnote symbols, see page 133.
courses in inorganic chemistry.

228A. Bioorganic Chemistry (3) III. Swinshield Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Defines role of bioorganic chemistry in the functioning of biological systems by identifying the role of small molecules and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year (next offering Spring 1993).

228B. Main Group Chemistry (3) III. Power Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Synthesis, physical properties, reaction mechanisms, and the role of main group compounds in the functioning of biological systems. Discussion of concepts of electronic deficiency, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year (next offering Spring 1993).

228C. Solid-State Chemistry (3) III. Kautzsch Lecture—3 hours. Prerequisite: courses 124A, 110B, or 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year (next offering Spring 1992).

230-A. Special Topics in Physical Chemistry (3) I, II. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in physical chemistry. Topics vary each time the course is offered.

231. Organic Synthesis: Methods and Strategies (3) III. Nantz Lecture—3 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling relative stereochemistry, and controlling absolute stereochemistry. Retrosynthetic strategies will be discussed throughout the lectures.

233. Physical-Organic Chemistry (3) II. Botlini Lecture—3 hours. Prerequisite: courses 128A-128B, 128C and 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. Schore, Zweifel 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.

236. Chemistry of Natural Products (3) II. The Staff Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biological activity, and biosynthesis. Biosynthetic origins will be used as a unifying theme.

237. Bioorganic Chemistry (3) I. Nambiar Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Offered in odd-numbered years.

240. Advanced Analytical Chemistry (3) I. Lebrilla Lecture—3 hours. Prerequisite: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific conductance; electron transfer in liquid solutions; fundamentals of separation science, including columns, gas and liquid chromatography.

241-A. Special Topics in Analytical Chemistry (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics vary each time the course is offered.

240 Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

293. Introduction to Research Chemistry (3) I. The Staff (Smith in charge) Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Grammar of research. Discussion of research activities in the Department and research topic selection. (SU grading only.)

295. Industrial Chemistry (1) I. Kurth Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (SU grading only.)

298. 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 investigations. Students wishing to enroll should communicate with the department well in advance of the quarters in which the work is to be undertaken. (SU grading only.)

Professional Course

390. Methods of Teaching Chemistry (3) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour: discussion—1 hour: laboratory—3 hours. Prerequisite: graduate student standing in Chemistry; consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of tests and supporting material, diagnosis of teaching techniques, preparation for and conducting of discussion sessions and observing and guiding student laboratory work. Participation in the teaching program required for Ph.D. in Chemistry. May be repeated for credit. (SU grading only.)

Chicano Studies

( College of Letters and Science)
Refugio I. Rochin, Ph.D., Program Director Program Office, 101 916-752-2421

Committee in Charge
Angie C. Chambra, Ph.D. (Chicano Studies, Spanish)
Richard A. Figueroa, Ph.D. (Education)
Yvette Flores-Ortiz, Ph.D. (Chicano Studies)
Barbara J. Merino, Ph.D. (Education)
Elvira Nava-Nava, Ph.D. (Chicano Studies)
Beatriz Peraquera, Ph.D. (Chicano Studies, Sociology)
Vicki L. Ruiz, Ph.D. (History)
Adalicia Sister-Riddell, Ph.D. (Chicano Studies)

Faculty
Angie C. Chambra, Ph.D., Assistant Professor (Chicano Studies, Spanish)
Yvette Flores-Ortiz, Ph.D., Assistant Professor (Chicano Studies)
Malvina Montoya, Ph.D., Professor (Chicano Studies)
Beatriz Peraquera, Ph.D., Assistant Professor (Chicano Studies, Sociology)
Adalicia Sister-Riddell, Ph.D., Lecturer S.O.E. (Chicano Studies)

The Major Program

The interdepartmental major now allows for two emphases, one in history and the other in sociology. The Chicano/Mexican studies, history, and sociology, history, and literature. This curriculum is flexible enough to accommodate primary professional interests in bilingual education, community or social service, or advanced graduate and/or professional preparation. The sociology track combines traditional courses in sociology with substantive area courses that deal intensively with the Chicano/Mexican experience. The sociology emphasis promotes a greater understanding of the social, political, and cultural life of Chicano/Mexican people, and it provides a solid basis of knowledge for those who wish to work in a bicultural setting. It is designed for students interested in public service careers such as law school, graduate school, public administration, or community groups. Students who have demonstrated language fluency in Spanish through the placement examination can accelerate their program considerably; thus the language placement examination is strongly recommended to all students entering the program.

A.B. Major Requirements:

**Humanities Emphasis**

UNITs

Preparatory Subject Matter

12-42

Chicano Studies 10

1

Chicano Studies 20

4

Literature 1

1

Spanish 1, 2, 3 (or the equivalent)

0-18

Spanish 4 or 7A, 5 or 7B

0-12

Depth Subject Matter

38-40

History 169A, 169B, 169A or 169B

12

Political Science 168

6

Sociology 110 or Spanish 124

4

Spanish 126, 129, 138

12

One course from Linguistics 115, 150, Education 151

3-4

One course from Spanish 131, 132, 133-34

Sociology Emphasis

UNTs

Preparatory Subject Matter

25-37

Chicano Studies 10

4

Chicano Studies 20

4

Literature 1

4

Sociology 1, 48A, 148

6

Spanish 4 or 7A, 5 or 7B

0-12

Depth Subject Matter

43

Chicano Studies 102

4

History 168

4

Literature 115

3

Political Science 168

4

Sociology 110, 148A, 148B, 168

16

Electives, a maximum of 12 units chosen from any of the following courses with no more than 2 courses from any one group

21

Group 1: History 168A, 168B, or 168A

12

Group 2: Linguistics 150, Spanish 126

12

Group 3: Sociology 118, Agricultural Economics 150

12

Group 4: Applied Behavioral Sciences 172, 176, Chicano Studies 132

Total Units for the Major

68-80

Master Adviser: A. Sosa-Rickell

Major Advisers:

Humanities Emphasis: A.C. Chambra, M. Montoya, V.L. Ruiz

Sociology Emphasis: Y. Flores-Ortiz, B. Peraquera

Further Study: If you are contemplating studies in a

NOTE: For key to footnote symbols, see page 133.
graduate or professional school you can, with the aid of an adviser, build a program around an additional discipline of your choice, i.e., Spanish or Spanish-American literature, history, or political science. If you are contemplating a career in bilingual education you should consult the Department of Education for information about the Teacher Credential Program.

Minor Program Requirements:
This interdepartmental minor provides the student with a general overview of Chicanos/Mexicanos in terms of the history, culture, political involvement and role in the society of the Southwestern United States.

UNITS
Chicana (Mexican-American) Studies
Chicana Studies 10 or 20
History 169A or 169B
Political Science 168
Sociology 110 or Spanish 124
Two elective courses to be chosen from
Chicana Studies 102, 132, Education 151, History 169A or 169B (not to duplicate one of the above), Linguistics 115, Sociology 169, Spanish 126

Courses in Chicano Studies
Lower Division Courses

10. Introduction to Chicano Studies (4) J. Soza-Riddell
Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicano (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas.

20. Development of Chicano Culture and Literature (4) J. Soza-Riddell
Lecture—3 hours; discussion—1 hour. Knowledge of Spanish not required. Panoramic view of the development of Chicano cultural and literary forms from the 1940s to the present. Course explores how Chicano literary texts and other artistic forms reflect social, political, and cultural transformations.

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

102. Chicanas in Contemporary Society (4) J. Soza-Riddell
Lecture—3 hours; term paper. Prerequisite: course 10 or Spanish 124 or History 169B. Analysis of the role and status of Chicanas in contemporary American society. Special emphasis is on their historical role, the political, economic and social institutions which have affected their status, and their contributions to society and their community.

130. United States-Mexican Border Relations (4) III. Riddell
Lecture—3 hours; term paper. Prerequisite: upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth analysis of immigration issues, border industrialization, women’s organizations, economic crises, and legal issues.

132. Political Economy of Chicana Communities (4) III. Riddell
Lecture—3 hours; term paper. Prerequisite: upper division standing; lower division Chicano Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana communities. Includes studies of traditional and modern theories and concepts applicable to Chicana communities with case studies of Chicana communities, especially in California and Texas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1 or 2.

184HA-HB-NC. Senior Honors Research Project (2-5) I, II, III. The Staff

Independent study—6-15 hours. Prerequisite: senior standing in Chicano Studies major. Student is required to read, research, and write Honors Thesis on Chicano Studies topics. (Deferred grading only, pending completion of sequence)

198. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge (P/NP grading only).

Prerequisite: upper division standing and consent of Program Chairperson.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge (P/NP grading only).

Prerequisite: upper division standing and consent of Program Chairperson.

Child Development (A Graduate Group)
Rosemarie Kraft, Ph.D., Chairperson of the Group
Group Office, 103 AOB 4 (916-752-4360)


Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to a master of science 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 adults in the community including the University’s Early Childhood Laboratory (ECL). Recipients of the degree gain sufficient background in the biological and social sciences to engage in research in social sciences, or pursue further study leading to a doctorate in child development or related fields.

Graduate Adviser. J.N. Waiker (Human Development).

Chinese

See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

Chinese and Japanese

(Collection of Letters and Science)
Robert Borgen, Ph.D., Program Director
Program Office, TB 134 (916-752-4995)

Committee in Charge
Robert Borgen, Ph.D. (Chinese and Japanese)
Donal Gibbs, Ph.D. (Chinese and Japanese)
Susan Griswold, Ph.D. (Chinese and Japanese)
Miao-siang Ng, Ph.D. (Chinese and Japanese)
Donald C. Prince, Ph.D. (History)
Benjamin E. Wallacker, Ph.D. (Chinese and Japanese)
Michelle Yeh, Ph.D. (Chinese and Japanese)

Faculty
Robert Borgen, Ph.D., Associate Professor
Chia-Ning Chang, Ph.D., Assistant Professor
Kazue Chavez, B.A., Lecturer

Y.H. Peter Chen, M.A., Lecturer
David W. Fahn, M.A., Lecturer
Donald Gibbs, Ph.D., Associate Professor
Susan Griswold, Ph.D., Associate Professor
Jong S. Kim, B.A., Lecturer
Kiedy Akin, Ph.D., Professor Emeritus
Yun-chen Li, M.A., Lecturer
Miu-siang Ng, Ph.D., Associate Professor
Hitomi Okada, M.A., Lecturer
Haruko Sakakibara, M.A., Lecturer
Ritsu Shigeyama, M.A., Lecturer
Benjamin E. Wallacker, Ph.D., Professor
Young Ming Wu, M.A., Lecturer
Michelle Yeh, Ph.D., Assistant Professor
Kazue Chavez, B.A., Lecturer

Related Courses. See East Asian Studies course listing.

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:

UNITS
Chinese

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. For details, consult the upper-division adviser.

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). M. Yeh (Chinese)

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

Courses in Chinese

Lower Division Courses

1. Elementary Chinese (5) I. The Staff
Lecture-discussion—5 hours. Introduction to Chinese grammar and developmental 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 credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student’s P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

1A. Intensive Elementary Modern Chinese (10) II. The Staff
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

2. Elementary Chinese (5) II. The Staff
Lecture-discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

3. Elementary Chinese (5) III. The Staff
Lecture-discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills, continuation of course 2.

3A. Situational Chinese (2) I, II. The Staff
Discussion—2 hours. Prerequisite: course 3 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and substitution drills, students have greater opportuni-
ties to develop spoken skills than is possible in course 3.

4. Intermediate Modern Chinese (4) I, II, III. The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 2. Intermediate-level training in spoken and written Chinese in cultural context.

5. Intermediate Modern Chinese (4) II. The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 4. Course in preparation for proficiency in Chinese.

6. Intermediate Modern Chinese (4) III. The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 5. Continuation of course 5.

6A. Situational Chinese (2) I, II. The Staff
   Lecture—1 hour. Situational Chinese conversation. May be taken concurrently. Required of students who are studying Chinese.

10. Modern Chinese Literature (in English) (4) I, II
   Gibbs
   Lecture—3 hours; discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey an understanding of what China has experienced in the twentieth century.

11. Great Books of China (2) I, II. Wallace
   Lecture—1 hour; discussion—1 hour. Selected readings in English translations. (P/NC grading only.)

86. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NC grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NC grading only.)

Upper Division Courses

104. Twentieth-century Chinese Fiction (in English) (4) III, NG
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history recommended. English language survey of Chinese fiction as it evolved amid the great historical, social, and cultural changes of the twentieth century. Thorough study of the most influential writers and genres.

105. Western Influences on Twentieth-Century Chinese Literature (in English) (4) III, NG
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or History 9A recommended. Introduction to Western literary thought into modern China, the expression of Western literary forms and techniques, and the development of Marxism in contemporary literary writing. Offered in even-numbered years.

106. Chinese Poetry (in English) (4) III, IV
   Yeung
   Lecture—3 hours; discussion—1 hour. Prerequisite: History 9A or any course on traditional Chinese recommended. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk song down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English.

107. Traditional Chinese Fiction (in English) (4) I, NG
   Yeung
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history. English-language survey of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as The Story of the Stone and famous Ming-Qing short stories.

108. Poetry of China and Japan (in English) (4) II
   Borgen
   Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures, which includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc.

Offered in odd-numbered years. (Same course as Japanese 108.)

109A-L. Topics in Chinese Literature (in English) (4) III
   Yeung
   Lecture—3 hours; discussion—1 hour. Prerequisite: depending on topic, course 10, 11, 104, 106, 107, or a course in Chinese history. Topics in Chinese literature may include: (A) women writers; (B) the literary revolution of 1917; (C) love in poetry; (D) the night-blind; (E) the city in fiction; (F) the recluse; (G) the literature of the early Republic; (H) literature in the cultural revolution; (I) the scholarly and the courtesan.

111. Modern Chinese: Reading and Discussion (4) I, II, III
   The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Readings in modern Chinese newspapers, articles, essays, and short stories, based on language skills developed in courses 1 through 6.

112. Modern Chinese: Reading and Discussion (4) II, III
   The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Readings in modern Chinese newspapers, articles, essays, and short stories, based on language skills developed in course 111.

113. Modern Chinese: Reading and Discussion (4) III
   The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Readings in modern Chinese newspapers, articles, essays, and short stories, based on language skills developed in course 112.

114. Introduction to Classical Chinese: Confucius (4) I, II
   Gibbs and staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Texts from the Confucian canon are read with the assistance of prepared word glossaries so that while learning to read classical Chinese, the students also experience the most influential books in the history of China in their original texts.

115. Introduction to Classical Chinese: Mencius (4) II
   Gibbs and staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.

116. Introduction to Classical Chinese: Narrative Styles (4) III
   Gibbs and staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 115. Continues course 115 by reading selections from the Records of the Grand Historian and other early influential works.

120. Advanced Chinese (4) I, II
   The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, oral comprehension, and translation. May be repeated once for credit.

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 when content varies.

131. Readings in Traditional Chinese Poetry (4) I
   Yeung
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song; surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language.

132. Readings in Modern Chinese Poetry (4) II
   Yeung
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Chinese poetry from the literary revolution of 1917 to the present surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture.

NOTE: For key to footnote symbols, see page 133.

140. Readings in Classical Chinese (4) I, II, III
   Walacker
   Lecture-discussion—3 hours; term paper. Prerequisite: consent of instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated twice for credit.

160. The Chinese Language (4) II
   Wallack
   Lecture-discussion—3 hours, 5 recitation—2 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—1-10 hours. Prerequisite: departmental permission. Work experience in the Chinese language with a formal term paper on a topic approved by instructor. (P/NC grading only.)

197T. Tutoring in Chinese (1-5) I, II, III. The Staff
   Tutoring—1-5 hours. Prerequisite: consent of Program chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NC grading only.)

198. Directed Group Study (1-5) I, II, III
   The Staff (Chairperson in charge)
   (P/NC grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/NC grading only.)

Graduate Course

299. Research (1-12) I, II, III. The Staff
   (GU grading only.)

Courses in Japanese

Lower Division Courses

1. Elementary Japanese (51) I, II, III, IV
   The Staff
   Lecture—5 hours; discussion—5 hours. Introduction to spoken and written Japanese in cultural context, 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/NC grading basis only. Although a passing grade will be charged to the student's P/NC option, no petition is required. All other students will receive a letter grade unless a P/NC petition is filed.)

1A. Intensive Elementary Japanese (51) I, II, III, IV
   The Staff
   Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

2. Elementary Japanese (5) I, II, III
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.

3. Elementary Japanese (5) III
   The Staff
   Lecture-discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.

4. Intermediate Japanese (4) I, II
   The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context.

4I. Intermediate Japanese (4) I
   The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 4 or the equivalent. Continuation of course 4.

5. Intermediate Japanese (4) III
   The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 5 or the equivalent. Continuation of course 5.

6. Intermediate Japanese (4) III
   The Staff
   Lecture—3 hours; recitation—2 hours. Prerequisite: course 5 or the equivalent. Continuation of course 5.

10. Masterworks of Japanese Literature (in English) (3) III, FAry
   Lecture—2 hours; discussion—1 hour. An introduction to Japanese literature: readings and discussion
in English of important works from earliest times to the present.

15. Introduction to Traditional Japanese Culture (3) II. Borgen
   Lecture—2 hours; discussion—1 hour. General intro-
   duction to Japanese culture from its beginnings
   through 1850, focusing on religion, thought, and
   the arts (visual art, literature, music). Indigenous
   traditions and the assimilation of foreign influences
   will be discussed. Readings and discussions in English.

25. Japanese Language and Culture (In English) (4) II. Borgen
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 1 or Linguistics 1 or Anthropology 4 recom-
   mended. Classification and communication of expe-
   riences. Daily life. Japanese language and cultural
   use in Japanese society. Speech levels and honorific
   language, language and gender, minority lan-
   guages, literacy. Role of Japanese in artificial intelli-
   gence and computer science. Offered in odd-
   numbered years.

98. Directed Group Study (1-5) I, II, III. The Staff
   (Chairperson in charge) (PMP grading only).

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
   (Chairperson in charge) (PMP grading only).

Upper Division Courses

   Lecture—3 hours; discussion—1 hour. Early
   Japanese literature from the 6th to the 12th century,
   focusing on key works and themes in Japanese
   literature.

102. Japanese Literature in Translation: The Middle
   Period (4) II. Griswold
   Lecture—3 hours; discussion—1 hour. The major lit-
   erary genres from the 12th century to the 18th centu-
   ry, focusing on key works and themes in Japanese
   literature.

   (4) III. Chang
   Lecture—3 hours; discussion—1 hour. Modern
   Japanese literature from the 1870s to the 1970s,
   focusing on key works and themes in Japanese
   literature.

104. Modern Japanese Language: War and Revo-
   lution (3) I. Chang
   Lecture—discussion—3 hours. Perspectives and sen-
   sitibilities with which major modern Japanese writers
   have interpreted the transformative and often poign
   ant experiences of war and socio-political upheavals
   from the late nineteenth century to the 1970s. Lec-
   tures, discussions, and readings in English. Offered
   in even-numbered years.

105. Modern Japanese Literature: Hero and Anti-
    hero (3) I. Chang
   Lecture-discussion—3 hours. The ways in which re-
   presentative heroes and anti-heroes in modern
   Japanese literature perceive, confront, struggle with,
   and resolve a wide array of social, moral, and intel-
   lectual problems in their times. Lectures, discus-
   sions, and readings in English. Offered in odd-
   numbered years.

106. Japanese Culture Through Films (3) II. Chang
   Lecture-discussion—3 hours. Aspects of Japanese
   cultural expression about love, the supernatural, and
   the family; perceptions of childhood, youth, and
   death as revealed in internationally-acclaimed films
   by Kurosawa, Ozu, Kobayashi, Itami, and Morita.
   Lectures, discussions, and readings in English. Films
   with English subtitles. Offered in odd-numbered
   years.

107. Poetry of China and Japan (in English) (4) II. Borgen, Yeh
   Lecture—3 hours; discussion—1 hour. A compara-
   tive approach to Chinese and Japanese poetry,
   examining poetic practice in the two cultures;
   includes a general outline of the two traditions,
   plus study of poetic forms, techniques, and distinct
   treatments of universal themes: love, nature, war, etc.
   Offered in odd-numbered years. (Same course as
   Chinese 108.)

110. Modern Japanese: Reading and Discussion
    (4) I. The Staff
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 110. Continuation of course 110.

110A. Spoken Japanese (2) I. The Staff
   Lecture—Discussion—2 hours. Prerequisite: course 6 or
   equivalent. Training in spoken Japanese for students
   with a basic working knowledge of the language.

110B. Spoken Japanese (2) II. The Staff
   Discussion—2 hours. Prerequisite: course 110A or
   equivalent. Training in spoken Japanese for students
   with a basic working knowledge of the language.

110C. Spoken Japanese (2) III. The Staff
   Discussion—2 hours. Prerequisite: course 110B or
   equivalent. Training in spoken Japanese for students
   with a basic working knowledge of the language.

114A. Japanese Composition (2) I. The Staff
   Lecture—2 hours; discussion—1 hour. Prerequisite:
   course 114A or consent of instructor. Continuation of
   course 114A.

114B. Spoken Japanese (2) I. The Staff
   Discussion—2 hours. Prerequisite: course 114B or
   consent of instructor. Continuation of course 114B.
   Training in spoken Japanese for students with a
   basic working knowledge of the language.

116. Japanese Composition (2) II. The Staff
   Lecture—2 hours; discussion—1 hour. Prerequisite:
   course 116A or consent of instructor. Continuation of
   course 116A.

121. Readings in Modern Japanese Literature
    1920-1945 (4) I. Chang
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 121 or the equivalent. Fourth-year level read-
   ing of representative works of modern Japanese lit-
   erature, including short stories, novels, poems, and
   dramatic works.

122. Readings in Modern Japanese Literature
    1945-1970 (4) II. Chars
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 122 or the equivalent. Fourth-year level read-
   ing of representative works of modern Japanese lit-
   erature, including short stories, novels, poems, and
   dramatic works.

123. Readings in Modern Japanese Literature
    1970 to Present (4) I. Griswold
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 123 or the equivalent. Fourth-year level read-
   ing of representative works of modern Japanese lit-
   erature, including short stories, novels, poems, and
   dramatic works.

134. Readings in the Humanities: Traditional Culture
    (4) I. Borgen
   Lecture—3 hours; discussion—1 hour or term paper.
   Prerequisite: course 134. Fourth-year level reading
   of modern works by major specialists on traditional
   Japanese culture: history, religion, thought, art, inter-
   national relations, and literary history and criticism,
   focusing on developing reading skills and learning
   about Japanese culture.

135. Readings in the Humanities: The Modern
    Period (4) I. Chang
   Lecture—3 hours; term paper. Prerequisite: course
   135. Fourth-year level reading of authentic modern
   writings on Japanese culture, history, philosophy,
   society, religion, art, politics, international relations,
   aesthetics, and comparative culture by prominent
   critics, commentators, and scholars.

136. Readings in Newspapers and Magazines (4) III. Griswold
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 136 or the equivalent. Fourth-year level read-
   ing of newspaper and magazine articles, articles,
   and materials on contemporary Japan. Offered in odd-
   numbered years.

137. Japanese Internship (1-12) I, II, III. The Staff
   Internship—3 hours to be arranged. Prerequisite:
   upper division standing and consent of instructor.
   Work experience in Japanese language, with analyti-
   cal term paper on a topic approved by instructor.
   (PMP grading only.)

197T. Tutoring in Japanese (1-5) I, II, III. The Staff
   Tutoring—1-5 hours. Prerequisite: consent of
   Program chairperson. Leading of small voluntary disci-
   sion groups affiliated with one of the Program's regu-
   lar courses. May be repeated for credit, but only 2
   units may be applied to the major. (PMP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff
   (Chairperson in charge) (PMP grading only).

199. Special Study for Advanced Undergraduates
    (1-5) I, II, III. The Staff (Chairperson in charge)
   (PMP grading only).

Graduate Courses

201. Introduction to Classical Japanese (4) I. Borgen
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 123 or the equivalent. Introduction to essen-
   tial grammatical structure of classical Japanese
   using selections from classical Japanese prose and
   poetry.

202. Introduction to Classical Japanese (4) II. Borgen
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 201. Readings of relatively easy texts of clas-
   sical Japanese prose and poetry assisted by annota-
   tions written in modern Japanese.

203. Introduction to Classical Japanese (4) III. Griswold
   Lecture—3 hours; discussion—1 hour. Prerequisite:
   course 202. Readings of classical and pre-modern
   Japanese prose and poetry beginning with late
   Heian works and proceeding to Kamakura, Murom-
  achi and later periods. Readings include plays, no
   n dramatic, classical Chinese text and early Meiji
   writings.

291. Seminar in Modern Japanese Literature: Major Writers (4) III. Chang
   Seminar—4 hours. Prerequisite: any one of courses
   131, 132, 133, 134, 135, or the equivalent. In-depth
   reading and critical analyses of major works by
   and critical literature on one or two prominent modern
   or contemporary writers such as Natsume Soseki, Mori
   Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki
   Junichiro, Abe Kobo and Oe Kenzaburo. Offered in
   even-numbered years.

299. Research (1-12) I, II, III. The Staff
   (SU grading only).

Classics

(College of Letters and Science)

David A. Traill, Ph.D., Program Director
Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)

Faculty
Richard E. Grimm, Ph.D., Associate Professor
Lynn E. Roller, Ph.D., Associate Professor
Wesley E. Thompson, Ph.D., Professor
David A. Traill, Ph.D., Professor

NOTE: For key to footnote symbols, see page 133.
The Major Programs

Classics, as a university discipline, can be defined broadly or narrowly. Broadly, it is the study of all aspects of ancient Greek and Roman life; narrowly, it is the study of the Greek and Latin languages and their literatures. The Department offers three majors that reflect these different definitions of the subject: the Classical Civilization major offers a broad interdisciplinary approach to the world of the Greeks and Romans, while the Latin and Greek majors focus on language and literature.

Classics is a discipline that is at once demanding and rewarding. It takes imagination and considerable effort to develop a sympathetic understanding of the concerns and preoccupations of people who lived more than two thousand years ago. Moreover, the languages which provide the key to understanding these cultures require a sustained commitment. In return, study of the Greeks and Romans enables the classist to gain a unique perspective on the full sweep of western civilization, for the influence of these peoples in areas of human endeavor has been all-pervasive and continues to this day. Even students who complete only one or two quarters of Latin or Greek find that they have a much clearer understanding of English grammar and that their vocabulary has been considerably enlarged. These are significant and lasting benefits.

Career Opportunities. Majors in Classics can make direct use of their knowledge in careers in library science, museum work, or high school teaching, or by going on to divinity school. There is no acute shortage of high school teachers of Latin nationwide. More generally, Classics is a highly regarded liberal arts degree that trains students to think critically about complex issues. These skills can be applied to any field. It is said that if you can succeed in Classics you can succeed in anything. It is a particularly good choice as a pre-law major—not because of the scattering of Latin phrases that survive in legal terminology but because of the meticulous attention to detail which the study of an ancient language requires and fosters. It is also a good tactical choice for a pre-medical major since medical schools are seeking to diversify their student intake by giving preference to those with unusual degrees. For whatever reasons, all the undergraduate majors in Classics at Davis in the last twenty years who have sought admission to law school have been accepted. Others have embarked on promising careers in a wide variety of fields including computers, library science, intelligence work, publishing, social work, and real estate.

Majors planning to go on to graduate work in Classics should bear in mind that professional classicists are expected to know both Greek and Latin and have reading competence in French and German.

Classical Civilization

A. B. Major Requirements:

Preparatory Subject Matter .......................... 0-15
Greek 1, 2, 3 (or the equivalent) ................. 15

Total Units for the Major .......................... 36-51

Recommended
Art 1A; History 2; Philosophy 21; Comparative Literature 1; Religious Studies 40.

Greek

A.B. Major Requirements:

Preparatory Subject Matter .......................... 0-15
Greek 1, 2, 3 (or the equivalent) ................. 15

Total Units for the Major .......................... 36-51

Recommended
Latin 1, 2, 3.

Latin

A.B. Major Requirements:

Preparatory Subject Matter .......................... 0-15
Latin 1, 2, 3 (or the equivalent) ................. 15

Total Units for the Major .......................... 36-51

Recommended
Latin 121; at least 31 additional upper division units in Latin.

The Minor Program

The Department offers minors in Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

Minor Program Requirements:

Greek .......................... 21
Greek 3 .......................... 12
Four upper division courses in Greek .......................... 16

Latin .......................... 21
Latin 3 .......................... 12
Four upper division courses in Latin .......................... 16

Graduate Program

The Department offers a master's degree in Classics with emphasis on either Greek or Latin. The program is suitable for high school teachers seeking to improve their qualifications and for students wishing to prepare themselves for admission to one of the more competitive doctoral programs in Classics.

Teaching Credential Subject Representative, R. E. Grimm. See also the Teacher Education Program.

Graduate Study. A program of study and research leading to the M.A. degree in Classics is offered. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser, D. A. Traill.

Courses in Classics

Lower Division Courses

4A. Classical Civilization (3) I. III. The Staff
Lecture—3 hours. An introduction to the literature, art, and institutions of Ancient Greece. General Education credit: Civilization and Culture/Introductory.

10. Greek and Roman Mythology (3) I, II, III. The Staff
Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

17A. Mediterranean Bronze Age Archaeology (3) I. Roller
Lecture—3 hours. Archeological monuments of the Ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture/Introductory.

17B. Greek Archaeology (3) II. Roller

17C. Later Greek and Roman Archaeology (3) III. Roller
Lecture—3 hours. Archeological monuments of the Greek world after the conquests of Alexander the Great, and the monuments of Rome and the Roman Empire. General Education credit: Civilization and Culture/Introductory.

20. Pompeii AD 79 (4) III. Traill
Lecture—3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Pliny's Natural History and other ancient authors. Offered in even-numbered years. General Education credit: Civilization and Culture/Introductory.

30. Greek and Latin Elements in English Vocabulary (3) I, III. The Staff
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected.

31. Greek and Latin Elements in Technical Vocabulary (3) III. The Staff
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms.

Upper Division Courses

140. Homer and Ancient Epic (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of Iliad, Odyssey, and Aeneid in English. Discussion of Homer's influence on the beliefs and values of their respective societies and the influence of Homer on Vergil. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: Classics 4A or 10.

141. Greek and Roman Comedy (4) III. Grimm
Lecture—3 hours; conference—1 hour. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: Classics 4A.

142. Greek and Roman Novel (4) III. Traill
Lecture—3 hours; term paper. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon, and the religious mysticism of Apuleius' The Golden Ass.

143. Greek Tragedy (4) II. Traill
Lecture—3 hours; term paper; Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles, and Euripides; lectures on the development and influence of Athenian tragedy. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-introductory. Recommended GE preparation: Classics 4A or 10.

174. Ancient Greek Sanctoraries (4) III. Roll
Lecture-discussion—4 hours. Prerequisite: course 178 or consent of instructor. The history, cults, and
Upper Division Courses

*108. Ovid (4) I. Grimm
Lecture—3 hours; paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid.

*101. Livy (4) I. Thompson
Lecture—3 hours; term paper. Prerequisite: course 3.

*102. Roman Comedy (5) I. Grimm
Lecture—4 hours; term paper. Prerequisite: course 3.

*103. Vergil: Aeneid (4) I. Trail
Lecture—3 hours; term paper. Prerequisite: course 3.

*104. Sallust (4) I. Thompson
Lecture—3 hours; term paper. Prerequisite: course 3.

*105. Catullus (4) I. Trail
Lecture—3 hours; term paper. Prerequisite: course 3.

*106. Horace: Odes and Epodes (4) III. Grimm
Lecture—3 hours; term paper. Prerequisite: course 3.

*108. Horace: Satires and Epistles (4) I. The Staff
Lecture—3 hours; term paper. Prerequisite: course 3.

*109. Roman Elegy (4) I. Grimm
Lecture—3 hours; term paper. Prerequisite: course 3.

*110. Caesar (4) I. Trail
Lecture—3 hours; substantial paper. Prerequisite: course 3. Translation and discussion of selected readings from Caesar. Grammar and reading introduction to Latin prose composition.

*111A-111B:111C. Silver Age Latin (4) III. Thompson
Lecture—3 hours; term paper. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age.

112. Cicero: Political Writings (4) I. Thompson
Recitation—3 hours; term paper. Prerequisite: course 3.

114. Cicero: Philosophical Works (4) II.
Lecture—3 hours; term paper. Prerequisite: course 3.

115. Lucretius (4) III. Grimm
Lecture—3 hours; term paper. Prerequisite: course 3.

116. Vergil: Eclogues and Georgics (4) III.
Lecture—3 hours; term paper. Prerequisite: course 3.

*121. Prosse Composition (5) I. Trail
Lecture—4 hours; term paper.

125. Medieval Latin (4) III. Trail
Lecture—3 hours; term paper. Prerequisite: course 3 and two upper division courses in Latin. Selected readings from the Vulgate and various medieval authors provide an introduction to the development in the Latin language and literature from the fourth to the fifteenth centuries.

198. Directed Group Study (1-5) II, III, The Staff (Program Director in charge)
(PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
(PNP grading only)

NOTE: For key to footnote symbols, see page 133.

Clinical Pathology

(School of Veterinary Medicine)

Joseph G. Zinkl, D.V.M., Ph.D., Acting Chairperson of the Department

Department Office, 1319 Haring Hall (916-752-0153)

Faculty

James S. Culver, D.V.M., Ph.D., Assistant Professor
Bernard F. Feldman, D.V.M., Ph.D., Professor
Emeritus

Nelson J. Jain, M.V.Sc., Ph.D., Professor
Donald E. Jasper, D.V.M., Ph.D., Professor Emeritus
Jiro K. Kaneko, D.V.M., Ph.D., Professor
Joseph G. Zinkl, D.V.M., Ph.D., Professor

Part-Time Clinical Faculty

Robert M. DuFort, D.V.M., Assistant Clinical Professor
John W. Switzer, D.V.M., Associate Clinical Professor
Courses in Clinical Pathology

Upper Division Courses

101. Comparative Hematology (2) III. 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 hematometry; comparative blood cellular morphology and function.

101L. Comparative Hematology Laboratory (2) III. Kaneko, Jain, Zink Lab—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematometry. Limited enrollment.

102. Clinical Biochemistry (4) I. Kaneko Lecture—3 hours; laboratory—2 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or Biochemistry 101A-101B, or consent of instructor. Principles and methods of clinical biochemistry; determination and interpretation of the biochemical constituents of the blood, urine, and other body fluids.

186. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

204. Normal and Abnormal Bone Marrow Cytology (1) I. Zink Lecture—laboratory—2 hours. Prerequisite: Veterinary Medicine 425 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of the 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, kinetics, homeostasis, cytochemistry, and functions of different leukocytes; physiological, functional, histochemical, and morphological changes in leukocytes in diseases; their role in immune and inflammatory processes. Offered in odd-numbered years.

206. Immunopathology (2) III. Jain, MacKenzie (Medicine) Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 120, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematologic diseases; reactions to blood transfusions; transplantation immunology. Offered in odd-numbered years.

254. Pathogenesis of Infectious Disease (2) I. Zink Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sciences. Introductory courses in microbiology, immunology, hematology, or consent of instructor. Features of pathogenicity and host defense mechanisms common to infection with bacteria, viruses, fungi, and protozoa are emphasized as well as the important species-related differences. Perinatal immune responses of dam and offspring are also considered. Offered in even-numbered years.

298. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge)

299. Research in Clinical Pathology (1-12) I, II, III. The Staff (S/U grading only

Communication

See Rhetoric and Communication

Community Development

(A Graduate Group)

Mark Francis, Ph.D., Chairperson of the Group

Group Office, 103 AOB 4 (Applied Behavioral Sciences), (916-752-4560 a.m. only)

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 under both master's degree plans, the thesis or the comprehensive examination. The program is designed to prepare students for professional roles as administrators, designers, planners, researchers, or technicians with some emphasis upon rural, nonmetropolitan communities and human service organizations. Training of community development is also aimed at preparing a professional to work within government or non-profit organizations in the realm of social and economic change. There is opportunity available for specialization in: (1) housing and the spatial environment, (2) minority communities, (3) women's issues in the community, (4) community health and human services, (5) environmental issues, and (6) rural and agricultural issues.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, cultural geography, or political science, and courses in community studies.


Community Health

See Medicine, School of

Community Nutrition

(College of Agricultural and Environmental Sciences)

The Major Program

Community Nutrition focuses on the behavioral, economic, and sociocultural factors that influence dietary practices and nutritional status of individuals and groups. The aim of Community Nutrition is the application of this knowledge in the development and implementation of programs to improve the nutritional status in the community. The 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 subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the adviser.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

Written/Oral Expression ........................................... 7-8
See College requirement ......................................... 7-8

Preparatory Subject Matter ........................................ 49-50

Biological Sciences (Biology Sciences 1A, 1B, 1C), Chemistry (Chemistry 1A, 1B), Computer science (Agricultural Science and Management 21 or Sociology 40) .................................................. 2-3

Cultural food habits (Nutrition 20) ................................. 4

Cultural social science (Anthropology 2, Geography 2, or Sociology 3) ................................. 4

Social research methods (Sociology 46A or Psychology 41) .................................................. 4

Statistics (Sociology 46B, Statistics 13) ......................... 4

Breadth/General Education ........................................ 6-24

Satisfaction of General Education requirement .......... 6-24

(Note that some of the Option Subject Matter may meet General Education requirements.)

Depth Subject Matter ............................................. 62-83

Biochemistry 101A-101B or Physiological Sciences 101A-101B .................................................. 7

Food Science and Technology 100A, 100B, 101A, 101B ........................................................................ 10


Nutrition 192 .................................................................. 2

Physiology 110, 110L .................................................. 7

Option Subject Matter ............................................... 28-32

Course work chosen from one of the following three options in consultation with adviser ......................... 18-20

Additional units in a related social or health science chosen in consultation with adviser ................................. 10-12

(May include a minor program in fields such as physical education, environmental toxicology, community development, statistics or the social sciences.)

Behavioral-Psychological Option

Psychology 1, Education 110 or Psychology 130

Psychology 112 or Human Development 100A or 100B .................................................. 10

Psychology 115 or Human Development 100C .................................................. 17


Applied Behavioral Sciences 173, 178 .................................................. 12

Consumer Science 100 .................................................. 12

Food Science and Technology 107, 117 .................................................. 14

Sociology 154 .................................................. 14

Anthropology 129, 130 .................................................. 14

Rhetoric and Communication 115 .................................................. 14

Economics and International Development Option

International Agricultural Development 10

Economics 1A, 1B .................................................. 12

Mathematics 16A .................................................. 12

Agricultural Economics 100A, 100B, 120, 130, 141 .................................................. 12

International Agricultural Development 103, 110B, 110D, 110A, 110C .................................................. 12

Economics 100, 101, 115A, 115B, 118, 123, 130, 162 .................................................. 12

Consumer Science 100 .................................................. 12

Anthropology 122, 126 .................................................. 12

Sociology 170 .................................................. 12

Economics 151A .................................................. 12

Environmental Studies 1, 165 .................................................. 12

Rhetoric and Communication 115 .................................................. 12

NOTE: For key to footnote symbols, see page 133.
Comparative Literature

(College of Letters and Science)

Gail Finney, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-9934)

Committee in Charge

Samuel G. Armistead, Ph.D. (Comparative Literature, Spanish)

Ruben Chaves, Ph.D. (Comparative Literature, Dramatic Art)

Gail Finney, Ph.D. (Comparative Literature, German)

Michelle Hannooch, Ph.D. (Comparative Literature, French)

Roland W. Hoermann, Ph.D. (Comparative Literature, German)

Manfred Kusch, Ph.D. (Comparative Literature, French)

Kari Lokie, Ph.D. (Comparative Literature, English)

Robert M. Tornasse, Ph.D. (Comparative Literature, French)

Maria B. Ury, Ph.D. (Comparative Literature)

Karl F. Zender, Ph.D. (English)

Faculty

Samuel G. Armistead, Ph.D., Professor (Comparative Literature, Spanish)

William E. Baker, Ph.D., Professor (English)

Margaret Bedrosian, Ph.D., Lecturer

Marc Ellis Blanchard, Agrégé de Lettres, Professor (French)

Ruby Cohn, Ph.D., Professor (Comparative Literature, French)

Gail Finney, Ph.D., Professor (Comparative Literature, German)

Tineke Hannooch, Ph.D., Assistant Professor (Comparative Literature, French)

Roland W. Hoermann, Ph.D., Professor (Comparative Literature, German)

Manfred Kusch, Ph.D., Associate Professor (Comparative Literature, French)

Kari Lokie, Ph.D., Assistant Professor (Comparative Literature, English)

Donna K. Reed, Ph.D., Lecturer

Peter M. Schaeffer, Ph.D., Professor (German)

Robert M. Tornasse, Ph.D., Professor

Maria B. Ury, Ph.D., Professor

Michelle Yeh, Ph.D., Assistant Professor

The Major Program

Few people would think of studying only English physics, German biology, French painting, or Spanish music. Yet most literature majors study books originally written in a single language. Comparative Literature, on the other hand, encourages students to read, think about, and compare books from different national languages and from different parts of the world—from Italy, Russia, as well as England and the United States, and from Asia, Africa, and Latin America as well as North America and Europe. Comparative Literature thus enlarges students' horizons by bridging the divisions between national cultures instead of concentrating on a single tradition. Both the major and minor programs allow students to combine courses in one or more national literature departments together with courses in Comparative Literature. Students who enjoy reading books, exploring ideas, and learning about different civilizations will find Comparative Literature a stimulating field of study.

The introductory course sequence, "Great Books of Western Civilization," provides both an overview of European literary culture from ancient times to the present and intensive practice in analytical thought and English composition. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign language in the original language. No foreign language is required for the minor.

Students majoring in Comparative Literature choose a first and a second literature of concentration, one of which may be English. After the introductory sequence, each student's major course work is divided between courses in the two literatures of concentration and Comparative Literature courses. These Comparative Literature courses encourage students to take a broad view of a historical period, a theme, a genre, or a literary movement. The wide variety of options in the program permits great flexibility and encourages interdisciplinary connections between literature and philosophy, psychology, history, and the arts. Each student's plan of study must be approved by an advisor at the beginning and end of each academic year.

Career Alternatives. Careers directly related to Comparative Literature include teaching, journalism, publishing, and translation. Most Comparative Literature majors, however, are preparing for other careers that will employ the skills they have learned in the process of acquiring a stimulating and enriching education. The major in Comparative Literature gains useful experience in one or more foreign languages, in careful analytical thinking, and in precise use of the English language. Because many professional schools consider an excellent background for their graduate disciplines, Comparative Literature provides valuable preparation (along with supplementary courses outside the major) for careers in business, government, medicine, or law.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter...12-42

Comparative Literature 1, 2, 3, 4, 5...5

Foreign language: sufficient preparation to insure satisfactory performance at the upper division level.0-30

Depth Subject Matter...40

Five upper division courses (including at least three in a language other than English) distributed between the first and second literatures of concentration with the approval of the advisor...20

Comparative Literature 141...4

Two additional upper division Comparative Literature courses, including at least one in a major literary period (such as 164A-D), genre (such as 160A-B, 161A-B, or 168A-B), or movement (such as 168A-C or 169)....8

Total Units for the Major 52-82

Recommended

Art 10H: Dramatic Art 20: Classics 10, History 4A, 4B, 4C: Philosophy 21, 22, 23.

Major Adviser. Michelle Hannooch (Comparative Literature, French).

All Comparative Literature majors and minors must consult with their advisor, individually, at least once at the beginning and once at the end of each academic year.

Honors Program. Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 194I during the first two quarters of the senior year. Only students who have attained a cumulative GPA of 3.5 in all courses satisfying the major (except elementary foreign language courses) at the end of the junior year will be eligible for the honors program.

Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

UNITS

Comparative Literature 141...4

At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended)....8

Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature.12

Courses should form a coherent program and should be chosen in consultation with, and with the approval of, the advisor.

Minor Adviser. Same as Major Adviser.

All Comparative Literature majors and minors must consult with their advisor, individually, at least once at the beginning and once at the end of each academic year.

Teaching Credential Subject Representative. Michelle Hannooch. See also the Teacher Education Program.

Graduate Study. Refer to Comparative Literature (A Graduate Group). See also the Graduate Division section in this catalog.
Courses in Comparative Literature

Lower Division Courses
1. Great Books of Western Civilization: From Myth to Faith (4) I, II, III. Director in charge. Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from The Epic of Gilgamesh to St. Augustine's Confessions. General Education credit: Civilization and Culture/Introduction.


4. *The Short Story and Novelle* (4) I. Ury. Lecture-discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period.

5. Fairy Tales, Fables, and Parables (3) I, II. Reed. Lecture-discussion—3 hours. An introduction to fairy tales, fables, and parables as recurrent forms and motifs in literature, through readings from such diverse writers as Aesop, Grimm, Chaucer, and Shakespeare, Kafka and Borges. General Education credit: Civilization and Culture/Introduction.


7. Literature of Fantasy and the Supernatural (3) III. Hoermann, Reed. Lecture-discussion—3 hours. An inquiry into the interrelationships of the fantastic and the unreal in the literature of dream and hallucination, fabulous landscapes and voyages, grotesque satire, and gothic horror. General Education credit: Civilization and Culture/Introduction.

8. Utopias and their Transformations (4) II. Hoermann. Lecture-discussion—3 hours; term paper. Prerequisites: English A. Consideration, in literary works from different ages, of visionary and rational variations on the perfection of a lost paradise, Golden Age, or Atlantis—and of the human nightmares that essentially result from perversions of the utopian dream. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

10A-N. Master Authors in World Literature (2) I, II, III. The Staff (Director in charge). Lecture-discussion—1 two-hour session. Designed primarily to acquaint the non-literature major with a particular author from the world's greatest and most important authors; readings in English translation. Content alternates among the following segments: (A) Gilgamesh, Ramayana, Beowulf, Nibelungenlied; (B) Chaucer, Shakespeare, Marlowe, Stendhal, Pushkin, Dostoevsky, Cervantes, Swift, Defoe, Gide, Kafka, Faulkner; (M) Iliad, Aeneid, Joyce, Woolf, Mann/Celine, Bulgakov/Tanzikai, O'Neill/Beckett, Lorca/Firandello; (N) Camus/Sartre, Garcia Marquez/Cortazar, Norman/Melville, Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)

9. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/NP grading only).

Upper Division Courses

140. Thematic and Structural Study of Literature (4) I. Yeh. Lecture-discussion—3 hours; term paper. Interpretation and selected works illustrating the historical evolution of themes, as well as of formal and structural elements.


142. Critical Reading and Analysis (4) II. The Staff (Director in charge). Lecture-discussion—3 hours; term paper. Prerequisite: completion of a selected text; scrutiny of very limited amount of material, with attention to the problems of texts in translation.


146. Myth in Literature (4) III. Schaefer. Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions.

153. The Forms of Asian Literature (4) I. Ury. Lecture-discussion—3 hours; term paper. Prerequisite: course 1, 2, or 3, and consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to in-clude the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

157. War and Peace in Literature (4) II. Blanchard. Lecture-discussion—3 hours; term papers. Prerequisite: course 1, 2, or 3, and consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. General Education credit: Civilization and Culture/Non-Introduction. Recommended GE preparation: any course from the GE Literature Preparation List.

158. The Detective Story as Literature (4) I. The Staff. Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context.

159A-G. Special Topics in Comparative Literature (4) I, II, III. The Staff (Director in charge). Lecture-discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play: Shakespeare; (B) The Novel: The Great Gatsby; (C) The Role of Philosophy in Literature; (E) The Role of Psychology in Literature; (F) The Religious Experience in Literature; (G) Literary Attitudes and Judgment. May be repeated for credit in different subject area. General Education credit 159C. Civili-
required to use the computer in solving complex tasks in today's society. Emphasis in this major is on software, although introductory architecture is included. The program provides opportunities for students to choose electives in the College of Letters and Science and in the College of Engineering. The program will prepare students for advanced work in computer science or in other disciplines requiring advanced knowledge of the use of computers. For students interested in the engineering aspects of computer science, see Engineering: Computer Science.

B.S. Major Requirements:

Preparatory Subject Matter

Computer Science Engineering 30 or 30H, 40 or 40H ................................. 8
Electrical and Computer Engineering 70 ......................................................... 4
Mathematics 21A-21B-21C, 22A-22B ............................................. 18
Statistics 32 .................................................. 3
One series from the following four .................................................. 15
   (a) Chemistry 1A-1B-1C
   (b) Chemistry 1A-1B and Biological Sciences 1A
   (c) Chemistry 4A-4B-4C
   (d) Physics 9A-9B-9C and Mathematics 22C

Depth Subject Matter .......................................................... 54

Computer science, core courses ............................................. 25
Computer Science Engineering 100, 110, 112, 120, 140, 150,
Electrical and Computer Science Engineering 171

Computer science electives .................................................. 14
Minimum of 14 units from Computer Science Engineering 142, 152, 160,
165, 168, 170, 172, 175, 191 (maximum 3 units), Electrical and Computer Science
Engineering 176, 177, 182A-182B
Upper division mathematics .................................................. 15
Minimum of 15 units of approved upper division courses in mathematics or
statistics. Any upper division course in mathematics or statistics is approved
for this requirement except the following:
Mathematics 106 and any mathematics course numbered above 188
Any statistics course numbered below 131 or above 188

Total Units for the Major ............................................... 102


Graduate Study. See the Graduate Division section in this catalog.

Computer Science (A Graduate Group)

Robert M. Keller, Ph.D., Chairperson of the Group

Faculty. Consists primarily of faculty members from the Division of Computer Science, the Department of Electrical Engineering and Computer Science, the Department of Engineering: Applied Science (Livermore), the Department of Mathematics, and the Graduate School of Management.

Graduate Study. The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. Research strengths lie in artificial intelligence, computer architecture, computer networks, computer systems design, database systems, computer graphics, programming languages, operating systems, performance evaluation, robotics, scientific computation, software engineering, and theory.

Preparation. Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial coursework in computer science). Applicants are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis or pass written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. applicants must pass preliminary written examinations in three of the following four areas: programming languages/compilers, operating systems, computer science theory, and computer architecture. The candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

Graduate Advisers. P. Linz, N.S. Matloff.

Consumer Economics

(College of Agricultural and Environmental Sciences)

Preparation. 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 Division section in this catalog.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics

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) (3) I. Sheppard, III. B. Butler, Summer Session

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 142.)

162. Direct Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(PPI grade only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(SU grade only)

Graduate Courses

293. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Current issues in consumer economics and the economics of consumption.

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

(SU grade only)
## Consumer Food Science

(College of Agricultural and Environmental Sciences)

### The Major Program

The Consumer Food Science major emphasizes both the biological properties of foods and the socioeconomic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, chemical, and social sciences to prepare them for careers such as food product development, quality assurance, marketing and sensory analysis, extension services, consumer communication, and community service. The major provides academic preparation for those who plan to pursue similar careers or to undertake graduate study in Food Science or Nutrition.

### 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written/Oral Expression</td>
<td>7-8</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>5-5</td>
</tr>
<tr>
<td>Biochemistry (Biochemistry 101A-101B)</td>
<td>4-7</td>
</tr>
<tr>
<td>Physiology (101A-101B)</td>
<td>4-7</td>
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<td>Biological science (Biological Sciences 1A)</td>
<td>4-7</td>
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<tr>
<td>Chemistry (Chemistry 1A-1B-1C, 8A-8B)</td>
<td>4-7</td>
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<tr>
<td>Computer science (Agricultural Science and Management 21)</td>
<td>3</td>
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<td>Microbiology (Microbiology 100, 105)</td>
<td>3</td>
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<td>Physics (Physics 10)</td>
<td>4</td>
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<tr>
<td>Physiology (Physiology 110)</td>
<td>5</td>
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<tr>
<td>Statistics (Agricultural Science and Management 150)</td>
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<td>Breadth/General Education</td>
<td>17-29</td>
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<td>Satisfaction of General Education require-</td>
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<tr>
<td>ments to include: Economic/Economics 1A-1B</td>
<td>10</td>
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<tr>
<td>Depth Subject Matter</td>
<td>56</td>
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<tr>
<td>Agronomic economics (Agricultural Economics 112, 141)</td>
<td>8</td>
</tr>
<tr>
<td>Community Nutrition (Nutrition 118, 20 or 190)</td>
<td>7.7</td>
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<tr>
<td>Consumer Science (Consumer Science 100, 135)</td>
<td>8</td>
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<tr>
<td>Food Science and Technology (100A, 100B, 101A, 101B, 104, 107, 111, 128)</td>
<td>24</td>
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<tr>
<td>Human nutrition with laboratory (Nutrition 110, 111, 112 or 113)</td>
<td>11</td>
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<tr>
<td>Restricted Electives</td>
<td>20</td>
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<td>Food and consumer related courses</td>
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<td>specified in accordance with student's edu-</td>
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<tr>
<td>cational goal with approval of adviser.</td>
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<tr>
<td>Unrestricted Electives</td>
<td>12-26</td>
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<tr>
<td>Total Units for the Degree</td>
<td>180</td>
</tr>
</tbody>
</table>

### Consumer Science

(University of Illinois at Urbana-Champaign)

### Major Programs and Graduate Study

Consumer Food Science is a related major. For graduate study, see the Graduate Division section in this catalog.

### Courses in Consumer Science

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising Office, 125 Evergreen Hall.

#### Lower Division Courses

- **47. Food Product Development Field Study (1)**
  - 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.)

- **48. Internship in Consumer Science (1-12)**
  - The Staff
  - Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-related experience on off-campus in a consumer science-related area. (P/NP grading only.)

#### Upper Division Courses

- **100. Consumer Behavior (3)**
  - The Staff
  - Lecture—3 hours. Prerequisite: preparation in areas of psychology or sociology. Concepts in consumer behavior are applied to consumer behavior on the part of the individual, social, and cultural organizations. Conceptual model to help guide and understand consumer research will be presented. General Education credit: Contemporary Societies/Non-Introductory. Recommended: GE preparation: any introductory GE course in psychol- ogy, economics, or sociology.

- **135. Principles of Food Product Development (3)**
  - Lecture—3 hours. Prerequisite: one course in intro- ductive food science. Presents basic concepts of product development and organization. Organization, activities, new product development, project management. Role of food regulations, consumerism, marketing, advertising, consumer research.

- **160. Current Topics in Consumer Research (1)**
  - Seminar—1 hour, term paper. Prerequisite: upper division standing. One-hour presentations, including time for questions and discussion, by guest speakers from on and off-campus on research projects in consumer studies. May be repeated once for credit. (P/NP grading only.)

- **190. Internship in Consumer Science (1-12)**
  - The Staff
  - Laboratory—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Work- related experience on off-campus in a consumer science-related area. (P/NP grading only.)

- **198. Directed Group Study (1-5)**
  - The Staff
  - (P/NP grading only.)

- **199. Special Study for Advanced Undergraduates (1-5)**
  - The Staff
  - (P/NP grading only.)

### Consumer Research Methods

- **200. Consumer Research Methods (3)**
  - Lecture—3 hours. Prerequisite: graduate standing of consent of instructor. Topics to include consumer laboratory and field attitude research, consumer sampling, measurement techniques, scales and methods of analysis.

### Notes:

- For key to footnote symbols, see page 133.
Critical Theory
Marc E. Blanchard, Agrégée de Lettres, Program Director (916-752-4767)
Program Office, 516 Sproul Hall, (916-752-5464)

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 eight participating departments (Comparative Literature, English, French and Italian, German and Russian, History, Philosophy, Psychol- ogy, 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 (200A, 200B) 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

Graduate Courses
200A. Approaches to Critical Theory (4) I-II. The Staff Seminar—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) II. The Staff Seminar—3 hours; discussion—1 hour. Prerequisite: course 200A. Application of critical theoretical perspectives to a common problem defined in interdisciplinary terms. Topics will vary.

201. Critical Theory Special Topics (4) III. The Staff Seminar—3 hours; discussion—1 hour. Prerequisite: course 200A. Application of theoretical principles to one specific research topic.

Dance
See Physical Education

Dermatology
See Medicine, School of

Design
(College of Agricultural and Environmental Sciences)
Facility: See under the Department of Environmental Design.

The Major Program
Design, as taught and practiced at UC Davis, brings together creativity and ingenuity, and is interdisciplinary in nature. This major attracts students who are interested in studies which will involve them in constructing the future shape of our everyday lives. The program is flexible, changing in content and site to reflect the needs and interests of the students, faculty, and society. Self-directed and motivated students contribute to the character of the Design program. They are guided by the faculty to form individualized programs of study around a core of required courses. Students gain not just knowledge of fundamental elements of the design professions as they currently exist, but also the outlook necessary to create new approaches to design, and to the development of design as a social tool. The program provides opportunities to acquire a knowledgeable and sound background in design, the skills to use this effectively, and the confidence to apply these skills to innovative design.

At the present time, this curriculum offers study in the areas of costume, textiles, environments, and courses in visual and graphic imagery. The lower division courses prepare the student in basic design practice and theory. Students are encouraged to develop an upper division program which includes courses from textile design, design of the environment, and wearable design and image making, in order to understand the role of design in the formation of our culture. Students may elect to concentrate in one of these areas. Through individual planning, the program offers flexibility to allow for (1) concentration on a specialty, (2) preparation for graduate programs, (3) general education in design stimulating the creativity of the individual, (4) development toward self-education through independent study, and (5) techniques to transmit knowledge or skill to one person or many, whenever the need arises.

The faculty is composed of a diverse group of designers and artists working in the fields of play environment and toys, wearable design and ethnic costume, the study of fantasy, printed imagery and book design, energy-efficient architecture, historical and contemporary textiles, textiles in the landscape, interior design, handprinted and dyed textiles, constructed textiles, display and exhibition design, building renovation and conversion, contemporary furniture and small art press printing.

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 overload courses, and requesting independent study, internship, or other similar courses.

B.S. Major Requirements:

Written/Oral Expression..............................7-8
See College requirement..............................7-8
Preparatory Subject Matter..............................32-34
Art (one course, e.g., Art 1A, 1B, 2C or 1D)..................4
Design (Design 1, 2, 3, 11, 12, 13)..................21
Other (two courses from American Studies 10, Anthropology 2, Psychology 1, Sociology 1, 2, Rhetoric and Communication 1, 3)..................7-9

Breath/General Education..............................32
Satisfaction of the General Education require- ment to include 16 units in natural science and/or Environment and 16 units in social science and/or Contemporary Societies..............................32

Depth Subject Matter..............................20-24
Design history, select from Design 140, 142A, 142B, 143, 144, 145 (Design, selected with advisor’s approval............12
Design, upper division courses......................36

Restricted Electives..............................21
(Courses to be selected with approval of advisor.)

Unrestricted Electives..............................25-28
Total Units for the Degree..............................180

Additional Requirement
Development of a course of study, in consultation with an adviser, no later than the second quarter of the junior year.

Major Adviser: H.B. Olsen (Environmental Design).

NOTE: For key to footnote symbols, see page 133.

Courses in Design
Questions pertaining to the following courses should be directed to the instructor or to the Ackert Center for the major, 152 Walker Hall (916-752-1165)

Lower Division Courses

1. Introduction to Design (4) I. The Staff ( Olsen in charge)
Lecture—4 hours. Evolution of 20th-century design emphasizing design elements, materials, principles, and vocabulary.

2. Design Methodology (4) II. The Staff ( Olsen in charge)
Lecture—4 hours. Prerequisite: course 1 recommended. Introduction to mental, visual, and sensory processes leading to creation of new forms, images, objects, and environments. Emphasis will be on imagining, producing, evaluating, and communicating ideas in the visual and physical realm.

3. Fantasy Design (4) III. Golube Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Investigation of fantasy as found in the environment. All aspects of design are explored and fantasy is presented as a problem-solving device.

11. Drawing Studio (4) I-Lecture—4 hours. Prerequisite: course 1 must be taken concurrently; priority enrollment to Design majors. Drawing for the designer as an aid to perception and communication of ideas, objects, and plans. May be repeated once with a different instructor (course 1 is not repeated).

12. Media Studio (4) II. The Staff ( Olsen in charge)
Lecture—4 hours; field trip. Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Tools, materials, and techniques used in the designer’s studio.

13. Photographic Media Studio (4) III. The Staff ( Olsen in charge)
Lecture—4 hours. Prerequisite: course 1 or 2; course 3 must be taken concurrently; priority enrollment to Design majors. Film and video tape for description, simulation, analytical research, and design development.

21. Drafting and Perspective (4) I. The Staff ( Olsen in charge)
Lecture—4 hours; field trip. Emphasis on the human image altered through ornament and its relation to the human structure.

24. Hand Constructed Textiles (4) I. Larky Lecture—4 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 ( Olsen in charge)
Lecture—4 hours; field trip. Prerequisite: courses 11, 12, and 13. Basic studio and photographic skills for the designer; continuous tone, line and halftone films, mechanical and four-color screen separations.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff ( Thomaz in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

121. Design Delineation (4) I. The Staff ( Olsen in charge)
Lecture—4 hours; field trip. Prerequisite: courses 11, 12, and 21. Exploration of the process of delineation, including principles of perspective drawing, rapid
124. Textile Structures (4) III. Lacy
Studio—8 hours; field trip. Prerequisite: course 23 or 24. An introduction to the design and construction of building structures in flexible materials. Students working in projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interior space.

125. Textiles in the Landscape (4) II. Shauwcraft
Lecture—2 hours; studio—5 hours. Prerequisite: courses 21, 22, 24. Structuring organic and mathematical form in textiles, working with the symbolic relationship of these textiles and their immediate placement in the outdoor landscape.

126A. Visual Presentation: Visual Merchandising (4) I, III. Gotelli
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. The study of three-dimensional objects in a spatial context with an emphasis on visual merchandising.

126B. Visual Presentation: Exhibition Design (4) II. Gotelli
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. The study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

131. Layered Textiles (4) II. The Staff (Olsen in charge)
Study—8 hours; one or two field trips. Prerequisite: background in drawing, personal adornment and non-loom textiles recommended. Exploration of multi-layered textiles: applique, patchwork, quilting, stump work. The individualized influences of materials and techniques on contemporary textiles.

132A. Loom-Constructed Textile Design (4) I. The Staff (Olsen in charge)
Study—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing hand identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations.

132B. Loom-Constructed Textile Design (4) II. Shauwcraft
Study—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

132C. Computer-Aided Textile Design (4) III. Shauwcraft
Studio—6 hours. Prerequisite: course 132B. Microcomputer applications to the design, structure, and weaving of fabrics, emphasizing advanced compositions, drafting, and piloting of multi-dimensional, original weave structures.

133A-133B. Visual Metaphor (4-4) II, III. Butler, Shauwcraft
Studio—8 hours. Prerequisites: courses 13, 22, 25. Study and practice of image generation and production with emphasis on clarity of visual expression, the perception and use of color, and visual composition in the three-dimensional context.

134A. Fundamentals of Interior Architecture (4) I. The Staff (Olsen in charge)
Studio—8 hours. Prerequisites: courses 11, 12, 13, and 14. This course is intended for senior standing, Introduction to design process through simple space planning problems focused on residential and small commercial installations.

134B. Fundamentals of Interior Architecture (4) II. The Staff (Olsen in charge)
Studio—8 hours. Prerequisite: course 134A. Problems emphasize energy considerations, structure, building systems, and architectural harmony in the urban environment.

134C. Fundamentals of Interior Architecture (4) III. Harrison
Studio—8 hours. Prerequisite: course 134B. Problems emphasize the design of special and technical environments such as laboratories, medical facilities, and computer installations and environments for the handicapped, aged, and very young.

135. Furniture Design (4) III. Olsen
Studio—8 hours; one or two field trips. Prerequisite: course 21; course 135 recommended. Development of furniture for interior and exterior spaces. Includes behavioral and physical requirements; historical and cultural expression; structural and aesthetic considerations.

140. History of Design (4) II. The Staff (Olsen in charge)
Lecture—4 hours. Prerequisite: Art 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology, consumer goods, handworkmanship, and industrial design.

142A. World Textiles: Far East and Pacific (4) II. Rivers (Olsen in charge)
Lecture—4 hours, field trip. Prerequisite: courses 132A, 132B, 160A, or 170A (concurrently) highly recommended. Textile arts of Japan, China, Africa, India, Oceania, Indonesia, and the Pacific islands with emphasis on the aesthetic and stylistic qualities of these cultures.

142B. World Textiles: Middle East, Europe and the Americas (4) III. Lacy
Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended. course 24, 124, 131, 132A, 132B, 160A-160B-160C or 170A-170B-170C (concurrently). Study of concepts and methods significant in the historical, social, aesthetic and stylistic development of the textile arts.

143. History of Costume Design (4) II. The Staff (Olsen in charge)
Lecture—4 hours; field trip. Prerequisite: course 140. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

144. History of Interior Design (4) II. III. The Staff (Olsen 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 dwelling in its cultural setting and the development of the theory of modern interior design.

160A-160B-160C. Textile Design (4-4-4) I, II, III. The Staff (Olsen in charge)
Study—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) II-III.
The Staff (Olsen in charge)
Study—8 hours; field trip. Prerequisites: courses 11 and 23. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary, and projected image of man as expressed through costume.

180A. Advanced Interior Architecture (4) I. Olsen
Study—8 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing buildings. Focus is on commercial and retail environments, code requirements, color and lighting.

180B. Advanced Interior Architecture (4) II. Barlow
Study—8 hours; field trip. Prerequisite: course 180A. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments.

180C. Senior Project in Interior Architecture (4) III. Harrison
Study—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. Harrison
Seminar—1 hour. Prerequisite: design major or consent of instructor. Philosophy of design explored through discussion and presentation of research results. May be repeated three times for credit. (P/NP grading only.)

161A-D. Workshops in Design (4-12) I, II, III. The Staff (Olsen 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 administered workshops featuring advanced study 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 (Olsen in charge)
Field placement—3-18 hours. Prerequisite: completion of 64 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).

197T. Tutoring in Design (1-5) I, II, III. The Staff (Olsen 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)

199. Special Study of Advanced Undergraduates (1-5) I, II, III. The Staff (Olsen in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only).

Development, Resource, and Consumer Economics

See Agricultural and Managerial Economics

Dietetics

(College of Agricultural and Environmental Sciences)

The Major Program

The Dietetics major provides the student with training in normal and therapeutic nutrition, biological and social sciences, and dietetic knowledge 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. Dietitians are sought for administrative, therapeutic, teaching, research, and public service positions in hospitals, schools, clinics, and other institutions. Students will be qualified for admission to both dietetics and 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. Even for more comprehensive courses as acceptable. Courses shown without parentheses are required.)

UNITS

Written/Oral Expression.8
Written expression (English 1 or 3)...........4
Oral expression (Public Speaking and Communication 1)...........4
(Above courses simultaneously satisfy College requirement)

Preparatory Subject Matter...........52-53
Biological sciences (Biological Sciences 1A, 1B)...........10
Chemistry (Chemistry 1A, 1B, 8A, 8B)...........16
Computer science (Agriculture and Management 21 or Computer Science Engineering 10)...........3
Economic principles (Economics 1A or 1B)...........6
Microbiology (Microbiology 102, 102B)...........6
Psychology (Psychology 1)...........4
Social science theory (Sociology 1 or 3 or Anthropology 2)...........4-5
Statistics (Statistics 100)...........4

Breadth/General Education...........6-24
Satisfaction of General Education requirement...........6-24

Depth Subject Matter...........71-72
Agricultural Economics 112...........4
Applied Behavioral Sciences 173 or Education 110 or 111...........4
Biological chemistry (Biochemistry 101A-101B or Psychological 101A-101B)...........6-7
Food Science and Technology 100A, 100B, 101A, 101B...........10
Food Service Management 120, 120L, 121, 122, 123, 124...........14
Physiology (Physiology 110, 110L)...........7

Unrestricted Electives...........23-43

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

Major Adviser: F. J. Zeman (Nutrition).

Advising Center: For the major is located in 1151 Meier Hall (916-752-0368)

Graduate Study: See the Graduate Division section in this catalog.

Dramatic Art
(College of Letters and Science)
Robert A. Fahner, Ph.D., Chairperson of the Department
Department Office, 222 Dramatic Art Building
(916-752-0368)

Faculty
Elizabeth Carlin, M.F.A., Assistant Professor
Ruby Cohn, Ph.D., Professor (Dramatic Art, Comparative Literature)
Robert A. Fahner, Ph.D., Professor
Ralph Fetterly, M.A., Associate Professor
Harry C. Johnson, M.A., Professor
William E. Kiehl, D.F.A., Associate Professor
Phyllis J. Kress, M.F.A., Adjunct Lecturer
Robert K. Sarfo, Ph.D., Professor
Daniel E. Snyder, Professor
Alan A. Stambouly, Ph.D., Professor
Darrell F. Wenig, M.A., Adjunct Lecturer

The Major Program
Dramatic Art, with its classroom courses in each of the scholarly and artistic areas of the discipline, and with its University Theatre Season and its Premiere and Studio Seasons, has the following objectives: to form intelligent theatre-goers as part of a liberal arts education (in both lower division and upper division work); to provide a foundation for potential specialists (primarily in upper division work); and to train specialists for careers in theatre, film, video, education, or related fields (graduate work).

The University Theatre. Each year the Department of Dramatic Art presents a series of stage productions of outstanding dramas from various periods and countries. 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 qualified students.

Granade Arts In-Residence Program. Each quarter a major British director joins the department to direct and teach directing.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter...........22
Dramatic Art 20A, 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
A minimum of 4.0 units chosen from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 125, 150, 153, 155, or, with the advisor'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 projects). Participation must include work in acting, scene construction, costume construction, lighting, and stage management. Majors are also expected to attend theatre performances.

Total Units for the Major...........62

Minor Program Requirements:

UNITS

Dramatic Art...........20
Dramatic Art 124A, 190A, 157, 159...........20
Major Adviser: E. Carlin, R. Fetterly.
Transfer Students: If you are a transfer student you should see the major adviser for an evaluation of your experience.

Teaching Credential Subject Representative: R. Fetterly. 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, design, directing, or play writing), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser: W.E. Kiehl.

Courses in Dramatic Art

Lower Division Courses
10. Introduction to Acting (3) I, II, III. The Staff. Laboratory-discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre production designed for students not specializing in Dramatic Art.
15. The Art of the Cinema (4) II. The Staff. Lecture—2 hours; discussion—1 hour; film viewing—2 hours. A view of cinema as an art form; its relation to other arts, its evolution with emphasis on the significant modern contributions.

NOTE: For key to footnote symbols, see page 133.

*15L. Introduction to Filmmaking (2) I. D. Hamilton. 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.

20. Introduction to Dramatic Art (4) I, II. Kiehl. 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. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning major in Dramatic Art.

21B. Fundamentals of Acting (4) III. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. Limited to those planning major in Drama.

24. Visual Aspects of Dramatic Art (4) III. Snyder. 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, Kiehl. 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. Kiehl. 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.

28. Visual Arts and Theatre (4) I, II. Snyder. Lecture-discussion—4 hours. The correlation between the visual arts and design for performance. Intended for students in the visual arts as well as for prospective majors.

30. Theatre Laboratory (1-5) I, II, III. The Staff. Prerequisite: course 29 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.

70. Theatre in Performance (4) I, II, III. Lecture—seminar—4 hours. Theatre attendance and appreciation; traditional and experimental. Field trips, readings and discussions. Intended for students not specializing in Dramatic Art as well as for prospective majors. May be repeated once for credit.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Primarily for lower division students. (P.N.P. grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (P.N.P. grading only)

Upper Division Courses

115. Advanced Study of Major Film Makers (4) I, II. D. Hamilton. Lecture-discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse
121A. Advanced Acting (4) I. Johnson
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 218B and consent of instructor. Theory and practice of acting focusing on performance problems; maximization of individual resources.

121B. Advanced Acting (4) II. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems; maximization of individual resources.

124A. Principles of Theatrical Design: Scenery (4) I. Feretely
Lecture—4 hours. Prerequisite: course 24 or consent of instructor. Scenic design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction.

124B. Principles of Theatrical Design: Scenery (4) II. Snyder
Lecture—3 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

124C. Principles of Theatrical Design: Lighting (4) III. Wilson
Lecture—4 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

124D. Principles of Theatrical Design: Costume (4) II. Kress
Lecture—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. Winn
Lecture—3 hours. Prerequisite: course 22. Theoretical study of backstage operation from audition through performance: techniques of stage management, technical direction, cueing procedures and audience control. Offered in even-numbered years.

127A. Principles of Directing (4) I. Stambusky
Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director's creative approach to the play and to its staging.

127B. Principles of Directing (4) II. Stambusky
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 127A and consent of instructor for non-majors. The director's creative approach to the theater.

150. American Theatre and Drama (4) II. Sarlos
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in odd-numbered years.

153. The American Musical (4) III. Klop
Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in odd-numbered years.

155. Black Theatre and Drama (4) III. Johnson
Lecture—4 hours. Black Theatre and drama today; the history, impact and current direction of the work of Blacks in the theatre. Offered in even-numbered years.

156. Theatre and Drama: Aeschylus to MachiavelI (4) II. Sarlos
Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through the Italian and Spanish Renaissance. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A or 4B.

157. Theatre and Drama: Shakespeare to Schiller (4) II. Sarlos
Lecture—4 hours. Selected plays and the history of the theatre from the English Renaissance through German and French Romanticism. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A or 4B.

158. Theatre and Drama: Ibsen to Albee (4) III. Fahmer
Lecture—2 hours. Selected plays and the history of the theater from English Romanticism to the present.

159. Contemporary Experimental Theatre and Drama (4) III. Kleb
Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events.

170A-160B. Principles of Playwriting (4-4) II. Kleb and staff
Lecture—4 hours. Course in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

180. Theatre Laboratory (1-5) I, II, III. The Staff
Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costume design, directing, and playwriting. Participation in departmental productions.

192. Internship in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge)
Field work—3 to 36 hours. Prerequisites: 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 enables students to practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only).

197T. Tutoring in Dramatic Art (1-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—1 to 4 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 (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

200. Methods and Materials in Theatre Research (4) Sarlos
Seminar—3 hours; term paper. Essential research tools in theatre research: critical theory, bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, II, III. Carlin
Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

212. Advanced Stage Movement (2) I, II, III. The Staff
Laboratory—4 hours. Prerequisite: open to advanced undergraduates with 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.

221. Special Problems in Advanced Acting (4) I, II, III. Johnson, Carlin
Seminar—3 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems relating to the structure of plays from ancient to modern. Open to advanced acting projects. Offered in odd-numbered years.

224A. Visual Problems in Theatre and Performance (4) I. Snyder
Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production related to the stage performance project. Open to Dramatic Art, Art, and Design majors. May be repeated for credit.

NOTE: For key to footnote symbols, see page 133.
Earth Sciences and Resources (A Graduate Group)

Mark E. Grimmer, Ph.D., Chairperson of the Group
Group Office, 113 Wehrmeyer Hall
(916-752-3243/4043)

Faculty. The Group consists of forty faculty members from the Departments of Applied Science Engineering, Chemistry, Civil Engineering, Environmental Studies, Geography, Geology, Land, Air and Water Resources, Mechanical Engineering, and Physics.

Graduate Study. The Graduate Group in Earth Sciences and Resources offers M.S. and Ph.D. degrees for advanced training in a variety of interdisciplinary areas within the earth sciences, particularly in hydrology and geochemistry. The Group encourages applications from students with a strong background in the physical sciences but little previous background in the earth sciences.

Preparation. Applicants to the program are expected to have completed or be in the process of completing 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 chemistry. Additional courses in advanced mathematics and computer programming are recommended. Also, either before entering the program or during the first year of graduate study, students will be expected to acquire familiarity with thermodynamics and continuum mechanics.

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 graduate departments.

Graduate Advisers. M.E. Grimmer (Landscape and Water Resources), M.L. Keswani (Civil Engineering).

Courses in Earth Sciences and Resources

Graduate Courses

200. Survey of Earth Sciences and Resources (2)
I. Grimmer
Lecture—1 hour; discussion—1 hour; paper. Prerequisites: open to all students. Students of the Earth Sciences and Resources program. Introductory course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of interest. May be repeated once for credit. (SU grading only.)

201. Earth Science and Resources (3) II. Mocro (Geology)
Seminar—3 hours. Prerequisite: Physics 98, Mathematics 222, 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 region. Energy, ore, and water resources. Graduate students in Geology may enroll only with consent of instructor.

257. Seminar in Earth Sciences (3) II. The Staff Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Seminar on current area of research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

413. Stage Make-up (1) II. The Staff Lecture—laboratory—2 hours. Prerequisite: consent of instructor; 1 Lectures, demonstrations, and practical work in aspects of theatrical make-up.

East Asian Studies (College of Letters and Science)

Susan Mann, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-1219)

Program Committee
Robert Borgen, Ph.D. (Chinese and Japanese)
Chia-ning Chang, Ph.D. (Chinese and Japanese)
Joyce K. Kallgren, Ph.D. (Political Science)
Whalen W. Lai, Ph.D. (Religious Studies)
Susan Mann, Ph.D. (History)
G. William Skinner, Ph.D. (Anthropology, Center for Comparative Research)
Benjamin E. Wallacker, Ph.D. (Chinese and Japanese)

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, combining sustained work in an East Asian language with courses on East Asian countries. The program provides preparation either for a career that involves working with East Asian affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field.

Students are required to develop a special field (e.g., anthropology, history, East Asian languages) within the major, to be chosen in consultation with their advisor.

Since six quarters of language work are required, students normally should apply no later than their sophomore year.

A.B. Major Requirements:

Preparatory Subject Matter 38-39
History 9A, 9B 8
One course from: Art 1D, 20, 70, 11, Comparative Literature 53A, History 90A, Japanese 10, 25, Religious Studies 70, 75 4
Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2, 3-4-5-6; Japanese 1-2-3-4-5-6) 27

Depth Subject Matter 36
Must include at least 8 units of core courses from each of the following categories: history, social science, and humanities. Core courses in each category are listed below.

History
History 190-190C, 194B-194C
Social Science
Anthropology 148A, 148B, 149A, 149B
Economics 171
Geography 127
Political Science 148A, 148B
Sociology 147

Languages
Art 163A, 163B, 163C, 164
Chinese 104, 106, 107
Japanese 101, 102, 103

Religious Studies 172
At least 12 additional units must be selected from the above courses, or from the following: Anthropology 110, 111, 112, 120, 123, 124, 128; Chinese (any upper division course); Economics 115A, 115B, 116, 163A, 163B, 162, Geography 143, History 102G, 102H, 102N, 190A, 191A, 191B, 193, 194A, 194D, 195; 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 (186, 199), as approved by the Committee in charge.)

Total Units for the Major 74-75

Recommended
Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America’s relations with East Asia.

Minor Program Requirements:

Courses taken for the minor are expected to reflect a predominant interest either in China or Japan, but also to provide some exposure to the other of the two countries. All courses counting towards the East Asian minor, including individual and group study courses (186, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominately with China, Japan, or both.

Units
East Asian Studies 22
History 98 and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9A and 18 upper division units, of which at least 12 must be in courses focusing on Japan 22

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 department listings for course descriptions.

Anthropology 148A, Traditional Chinese Society
148B, Communist Chinese Society
149, Culture of Japan

Art
1D, Asian Art
20, Myths and Symbols in Chinese Art
163A, Chinese Art
163B, Chinese Painting
Ecology (A Graduate Group)

Theodore C. Foin, Ph.D., Chairperson of the Group
Group Office; 3122 Wickson Hall (916-752-6752)
Faculty. The Group includes faculty from 45 departments
in five schools and colleges.

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in the areas of
biological, human, and physical and chemical ecology.
Several areas of specialization are possible in each of
these three areas. Details of the program may be obtained from the Chairperson of the Group or the
Group office.

Preparation. Appropriate preparation is undergraduate
work in any of the biological, social or behavioral,
and physical sciences, mathematics or engineering.
Applicants to the biological and physical-chemical options will normally be expected to have completed
two courses each in introductory biology, general chemistry, physics, mathematics, statistics,
and evolution. Applicants to the human ecology option may substitute quantitative social science courses for up to two courses of chemistry or physics.
Each of the three broad areas requires certain advanced preparation appropriate to the option.
Details may be found in the Group Announcement.

Course Requirements. The Ecology program is one of the most diverse on the Davis campus. In order to accommodate various student interests, the Group depends on close consultation between students and faculty for program development. A list of
recommended courses for various options is available from the Group office.

Graduate Adviser. T.C. Foin.

Courses in Ecology

Graduate Courses

200A. Principles and Application of Ecological Theory (4). L. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: course 190C, 193, or consent of instructor. Knowledge of Chinese required. Reviewing
and analyzing of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic techniques, social values and film topics from 1930s to today. Not open for credit to students who have completed Chinese 113.

192. East Asian Studies Internship (1-12) I, II, III.
The Staff
Internship—3—36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III.
The Staff (Chairperson in charge)
Independent study—1—5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.)

196. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)

NOTE: For key to footnotes symbols, see page 133.

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 103 or Botany 125, and Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced under-
graders with an introduction to literature and contemporaneous research into processes structuring ecological
communities. Particular emphasis placed on ecological phenomena with a significant spatial component.
(e.g., gene flow, colonization, and extinction). 206. Concepts and Methods in Plant Community Ecology (4). 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 succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories.

207. Plant Population Biology (3) I. Rice (Agronomy), Jan (Agronomy)
Lecture—2 hours; laboratory—discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced under-
graders with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be paced on linking ecological and genetic approaches to plant population biology. Offered in odd-numbered years. (Same course as Agronomy 207.)

210. Advanced Topics in Human Ecology (4) III.
Orlove (Environmental Studies)
Lecture—3 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in problems relating human popula-
tions and environmental variables. General epistemological issues and theoretical models are reviewed. Similarities and differences of human and biological ecology are examined. Offered in odd-numbered years.

211. Advanced Topics in Cultural Ecology (3) I.
Orlove (Environmental Studies)
Lecture—3 hours; discussion—graduate standing. Discussion and evaluation of theories which relate environment, culture and ecology. The development and evaluation of several major theories will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in even-numbered years. (Same course as Anthropology 211.)

212A. Environmental Policy Analysis (4) III.
Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: course in public policy (e.g., Political Science 107 or 108); course in bureaucratic policy making (e.g., Environmental Studies 168 or Political Science 181); 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 odd-numbered years. (Same course as Environmental Studies 212A.)

212B. Environmental Policy Analysis: Evaluation (4) I.
Schwarz (Environmental Studies)
Lecture—1 hour; discussion—graduate standing; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 or the equivalent; Environmental Studies 186A (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 odd-numbered years. (Same course as Environmental Studies 212F.)

213. Population, Environment, and Social Structure (4) II. The Staff
Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Relationships among population dynamics, resource scarcity and environmental problems, and social structure; focus on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and debates about scarcity, inequity, and social conflict and change. Offered in even-numbered years.

*221. Chemical Aspects of Ecology (3) I.
Lecture—3 hours. Prerequisite: Chemistry 1A-1B-1C and 1B or 12B (or the equivalent), a course in biological ecology; graduate standing and consent of instructor. A week will be spent on each of nine subjects including chemical ecology of reproduction, nutrition, defense, communication, adaptation, and ecosystem structure and function. Offered in odd-numbered years.

*220. Analysis of a Selected Ecosystem (4) I.
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Application of basic ecological principles to the interpretation of biotic and abiotic interactions of a particular ecosystem. Recent advances in theory, and basic information are emphasized.

222. Theoretical Ecology (3) III. Hastings (Environmental Studies)
Lecture—3 hours. Prerequisite: courses 204, 205 and 222A-222B; or Environmental Studies 100, Environmental Studies 128 or Zoology 125, and Mathematics 110B 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 even-numbered years.

290. Seminar in Ecology (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.)

291. Biological Conservation (3) II. Schonewald-Cox (Ecological Studies)
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examine characteristics of populations that make them vulnerable to extinction and evaluate various methods that can be used in the restoration process. Although both plants and animals are of interest, emphasis will be on vertebrates. Offered in odd-numbered years.

296. Topics in Ecology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing in Ecology. (S/U grading only.)

297. Tutoring in Ecology (1-4) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

Economics

College of Letters and Science
Steven M. Sheffrin, Ph.D., Chairperson of the Department
Department Office, 381 Kerr Hall (916-752-0741)

Faculty
Giacomo Bonanno, Ph.D., Assistant Professor
Severin Borenstein, Ph.D., Associate Professor
Andrezj Brzeski, Ph.D., Professor
Robert C. Feenstra, Ph.D., Associate Professor
Bruce Glassbrenner, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer
L. Jay Helms, Ph.D., Associate Professor
Kevin D. Hoover, Ph.D., Assistant Professor
Hirokazu Kaneko, Ph.D., Professor
Tracy R. Lewis, Ph.D., Professor
Peter H. Lindert, Ph.D. Professor
Louis Markowski, Ph.D., Associate Professor
Thomas Meyer, Ph.D., Professor
Julie A. Nelson, Ph.D., Assistant Professor
Alan L. Olmstead, Ph.D., Professor
John E. Hoerner, Ph.D., Professor
Kevin D. Salvi, Assistant Professor
Steven M. Sheffrin, Ph.D., Professor
T. Y. Shen, Ph.D., Professor
Jasopam Silverstone, Ph.D., Professor
Arthur M. Sulkin, Ph.D., Professor
(Economics, Management)
Robert K. Triest, Ph.D., Assistant Professor
Elias H. Tuma, Ph.D., Professor
Gary M. Watson, Ph.D., Professor (Economics, Management)
Leon L. Weigge, Ph.D., Professor
Wing T. Woo, Ph.D., Assistant Professor

The Major Program
Economics is the study of social human arrangements and institutions used in mankind’s efforts to satisfy material wants. The economic problem is to maximize the satisfaction of society’s material wants within the limits established by the availability of resources and the state of our knowledge, with due allowance for non-economic values. To maximize the economy’s economic welfare, a society must utilize scarce resources more efficiently in the production of goods of highest social priority and then distribute that output equitably among its members. A major in economics will assist the student to learn how economists examine these questions, and is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>22-26</td>
</tr>
<tr>
<td>Economics 1A-1B</td>
<td>10</td>
</tr>
<tr>
<td>Statistics 12, 32, or 102</td>
<td>3-4</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>9-12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>40</td>
</tr>
<tr>
<td>Economics 100 or 103M</td>
<td>10</td>
</tr>
<tr>
<td>One course from section 110A, 110B, 111A, 111B</td>
<td>4</td>
</tr>
<tr>
<td>Additional economics courses to achieve a minimum of ten division units</td>
<td>18</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>82-86</td>
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</tbody>
</table>

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 at graduation, a student must take all upper division courses in Economics for a letter grade, at least a grade-point average in those courses, and complete at least six units of course work that result in the submission of an Honors project. Consult the College of Letters and Science Undergraduate Committee and contact the Department for more information.


Teaching Credential Subject Representative. A. Brzeski. See also the Teacher Education Program.

Graduate Study. Students who meet the admission requirements of the Graduate Division and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Economics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and contact the chairperson of the departmental graduate committee.


Courses in Economics

Lower Division Courses

1A. Principles of Microeconomics (5) I. Gustafson and staff; II. Watson; III. Staff Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies/Introduction. (CAN Econ 4)

1B. Principles of Macroeconomics (5) I. Kaneda; II. The Staff; III. Tuma Lecture—3 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. General Education credit for non-GE course sequence (1A-1B) which satisfies one GE course: Contemporary Societies/Introduction. (CAN Econ 2)

11A. Elementary Accounting (4) I, II. The Staff Lecture—3 hours; discussion—2 hours. History and basic concepts of accounting; the ledger, journals, income statement, and the balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements. (CAN Econ 2)

11B. Elementary Accounting (4) II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Continuation of course 11A. (CAN Bus 4)

92. Internship and Field Work (1-12) I, II, III. The Staff Laboratory—3-36 hours; term paper. Prerequisite:
junior or senior standing; availability of internship position or approved field work project; stock brokerage internships must have completed course 11A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.)

98. Group Study for Undergraduates (1-5), I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Primarily for lower-division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5), I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

110. Intermediate Micro Theory (5) I, II, III. The Staff. Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Price and distribution theory under conditions of perfect and imperfect competition; welfare economics. (Not open to students who have received credit for course 100M or Agricultural Economics 100A or 100B.)

100M. Intermediate Micro Theory (5) I. Silvestre Lecture—4 hours; discussion—1 hour. Prerequisite: course 1A-1B; Mathematics 16A-16B or Mathematics 21A-21B each with a grade of C- or better. Theory of the consumer and the firm. Markets under perfect and imperfect competition. General Equilibrium and Welfare Economics. Use of calculus concepts and techniques. (Not open to students who have completed course 100, Agricultural Economics 100A or 100B.)

101. Intermediate Macro Theory (5) I, II, III. The Staff. Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Theory of income, employment and prices under static and dynamic conditions.

105. History of Economic Thought (4) III. The Staff. Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Historical survey of economic doctrine: the Classical School and its antecedents, Neoclassical thought, criticism of classical thought, emergence of modern economic thought.

106. The Great Economists—Ideas, Theories and Ideologies (4) II. Tuma. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Perspectives on capitalism and markets. Emphasis on Marx and his times. Emphasis on links to other social sciences. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Economics 1A-1B.

110A. Economic History (4) I. Tuma. 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) II. Walton. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from Colonial times to 1895; reference to other regions in the Western Hemisphere.

111B. Economic History (4) III. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from 1895 to the post World War II era.

115A. Economic Development (4) I. Kaneda. The Staff. 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 development, welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization.

115B. Economic Development (4) II. Kaneda. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, debt, growth and structural change. Important issues of policy concerning international borrowing and external debt of developing countries.

116. Economic Systems (4) II. Brzeski. Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Critical examination of major economic systems: their goals and institutions; capitalism, fascism, and varieties of socialism; problems of economic planning in USSR, India, China, and other industrializing economies.

117. The Soviet Economy (4) III. Brzeski. Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of Soviet economic theories, policy, economic planning, systems of production, methods of planning, and performance.

118. Political Economy of Agrarian Reform (4) III. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of Soviet economic theories, policy, economic planning, systems of production, methods of planning, and performance. (Not open to students who have completed course 100, Agricultural Economics 100A or 100B.)

119. Marxian Economics (4) I. Roemer. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M). Marxian economic theories, including theories of value, surplus value and exploitation; accumulation, the business cycle and crises; the role of the State and its relation to classes; imperialism. Writings of Marx and economists in the Marxian tradition will be studied.

120. Economics of War and Peace (4) III. Tuma. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Explores economic causes and effects of war; analyzes war and peace situations by comparing theoretical and empirical case studies. Offered in odd-numbered years.

121A. Industrial Organization (4) II. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), or consent of instructor. An appreciation 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. Lewis. Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries.

123. Ecology and Economics (4) I. Gustafson. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economics and populations as self-regulating systems; economic regulation of populations in their environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects of agricultural growth.

125. Urban Economics (4) I. Sullivan. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and 100. Explores the markets for products behind the development of cities, explaining the existence of citizenships and urban productivity, distribution of activity within cities. Explores the effects of policies that address problems such as poverty, inadequate housing, congestion, pollution, interior education, and crime.

130. Public Macroeconomics (4) I. Silvestre. Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, or consent of instructor. Public expenditures; theory and applications. Efficiency and equity of consumer 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) II. Helms. Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, or consent of instructor; course 101 recommended. Financing government expenditures. Efficiency and equity aspects of taxes, including personal income tax, property taxes, and sales tax loopholes and tax reform; revenue sharing; macroeconomic effects of taxation vs. debt financing.

134. Corporation Finance (4) I. The Staff. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 11A, Mathematics 16A; Statistics 13. General background and rationale of corporation financing as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rates, financial decisions. Students who have completed Agricultural Economics 171A may not receive credit for this course.

135. Money, Banks and Financial Institutions (3). Mayer; II. The Staff. Lecture—3 hours. Prerequisite: courses 1A-1B or consent of instructor. Monetary institutions, the bank ing system, money creation, the Federal Reserve System, the costs of money.

136A. Monetary Theory (4) II. Makowski. 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) III. Mayer. 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) III. 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 hypotheses testing in economics through the study of the theory and application of linear regression models, critical evaluation of selected examples of empirical research and exercises in applied economics.

151A. Economics of the Labor Market (4) I. Cameron. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100 or 100M. Theory of labor 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. Offered in odd-numbered years.

151B. Economics of Human Resources (4) III. Triest. Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy. Offered in odd-numbered years.

160A. International Microeconomics (4) I. Lindert; II. The Staff. 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 economies; 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
Economics

Instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues, international financial institutions and their policies. Students who have completed course 116E may receive only credit for 116E.

162. International Economic Relations (4) II. Woos Lecture—3 hours: discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment; Emphasis on current policy issues. Course intended especially for non-major students. Students who have completed course 160A or 160B may receive credit for this course.

170. Economy of the Middle East (4) III. Luma 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 East Asia. Consult department for course scheduling.

172. Economy of South Asia (4) IV. Gargon 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 South Asia. Consult department for course scheduling.

173. Economy of South-East Asia (4) III. Glassburn 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 Southeast 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 Europe. Consult department for course scheduling.

175. Economy of Sub-Saharan Africa (4) I, II. 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.

180. Topics in Economics (4) I. Bonanno, III. Makowski Lecture—discussion—4 hours. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

192W. Internship in the Davis-In-Washington Program (4-6) III. The Staff Internship—QTR. 18 hours. Prerequisite: junior or senior standing in Economics; completion of 84 units of credits with a minimum grade-point average of 3.00; admission to the Davis-In-Washington Program. Internship in Washington, D.C. with associated research project. Students must arrange for a faculty sponsor before embarking on the internship. Minimum of 3 units will count toward satisfying Economics major requirements. (PNP grading only)

194HA-194HB. Special Study for Honors Students (3-3) III-III. The Staff (Nelson in charge) Independent study—2 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing. Prerequisite: in Economics or with associated research project. Independent study of a topic under the direction of a faculty advisor. (Deferred grading only, pending completion of course.)

187T. Tutoring in Economics (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—4 hours. Undergraduate tutors will lead small voluntary discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of, the instructor in charge of the course. Units may not be counted toward satisfaction of major requirements. (PNP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—4 hours. Prerequisite: consent of instructor. (PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNP grading only)

Graduate Courses

200A. Microeconomic Theory (5) II. The Staff (Chairperson in charge) Lecture—4 hours: discussion—1 hour. Prerequisite: course 200M. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, monopolistic, and monopolistic markets. (Same course as Agricultural Economics 202A.)

200B. Microeconomic Theory (5) III. Helms Lecture—4 hours: discussion—1 hour. Prerequisite: course 200A or consent of instructor. Introduction to theories of welfare economics in a general equilibrium, linear economic models, extremalities and market failure, social welfare functions. (Same course as Agricultural Economics 200B.)

200C. Microeconomic Theory (4) I. Makowski Lecture—4 hours: discussion—1 hour. Prerequisite: courses 200A, 200B. Introduction to non-cooperative game theory with applications to microeconomic theory. Applications include principal-agent problems, bargaining and contract, imperfect competition and reputation formation. (Same course as Agricultural Economics 200C.)

200D. Microeconomic Theory (4) I. Naylor Lecture—4 hours: discussion—1 hour. Prerequisite: course 200A. Microeconomic theory of income, employment, and prices.

200E. Macroeconomic Theory (4) III. Brady Lecture—4 hours: discussion—1 hour. Prerequisite: course 200E (may be taken concurrently) and 200D. Macroeconomic theory of income, employment, and prices.

200M. Optimization in Economics (5) I. Silvestre Lecture—4 hours: discussion—1 hour. Prerequisite: course 100 or 100M and 101, or Agricultural Economics 100A-100B and course 101; Mathematics 21A, 21B, and 21C. Macrostatic theory of income, employment, and prices.

200N. Optimization in Economics (5) II. Loom Lecture—4 hours: discussion—1 hour. Prerequisite: course 100 or 100M and 101, or Agricultural Economics 100A-100B and course 101; Mathematics 21A, 21B, and 21C. Macrostochastic theory of income, employment, and prices.

201A. History of Economic Thought (4) III. Wegge Lecture—3 hours: discussion—1 hour. Economic thought from the classical Greece era to modern times.

201B. History of Economic Thought II (4) I. Shen Lecture—3 hours: discussion—1 hour. Origins and emergence of modern economic analysis. Offered in even-numbered years.

202. Topics in Economic Theory (4) I. The Staff Seminar—4 hours. Prerequisite: courses 200A through 200E or consent of instructor. Recent developments in economic theory.

203A. Convexity and Optimality (4) I. Silvestre Seminar—4 hours. Prerequisite: courses 200A and 200B; Mathematics 127A recommended. Advanced topics in the theory of the firm; distribution theory; welfare economics.

203B. Advanced Economic Theory (4) II. Makowski Seminar—4 hours. Prerequisite: courses 200A and 200B; Mathematics 127A recommended. General equilibrium theory; capital theory; growth theory.

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 21A, 21B and 21C (or Mathematics 18A, 18B, and 18C). Advanced microeconomic theory. (For advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households; theory of markets, partial and general equilibrium analysis, welfare economics; illustrations and applications. (Same course as Agricultural Economics 204.)


207. Contemporary Economics Seminar (3-5) I. Triet II. Bonanno III. Hoomav Seminar—2 hours and discussion—2 hours (3 units); seminar presentation (9 units). Prerequisite: consent of instructor. Participation of outside speakers on topics of current research. Discussion sections in which instructor and students review background material. Students who enroll for 5 units present seminar or own work. (SU grading only.) May be repeated for credit.

208. Theory of Games (4) III. Bonanno Lecture—3 hours: discussion—1 hour. Prerequisite: course 200M or consent of the instructor. Covers the most recent developments in game theory, with the focus changing from year to year. Topics include: refinements of Nash equilibrium, repeated games and the theory of social institutions, evolutionary game theory, games with bounded rationality, bargaining theory.

209. Economics of Distributive Justice (4) I. Roemer Lecture—4 hours. Prerequisite: course 200B. Introduction to formal models of distributive justice; free allocations; axiomatic bargaining theory; axiomatic characterizations of allocations of resource allocation. Applications to modeling of the distributed theories of political philosophers J.S. Mill, G.W. Rawls, R. Nozick, and G.A. Cohen.

210A. Economic Theory (4) I. Glassburn Lecture—discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.

210B. Economic History (4) II. Ostrem 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)

215A. Economic Development (4) I. Jarvis (Agricultural Economics) Seminar—3 hours; discussion—1 hour. Prerequisite: bachelor's degree in Economics (or the equivalent), or consent of instructor. Seminar series on economic development as they relate to developing nations; demographic problems; distribution issues in economic development. (Same course as Agricultural Economics 215A.)

215B. Macroeconomic Development (4) II. Kaneda Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A. The macroeconomics of economic development; monetary and fiscal problems; international trade; specific country studies. (Same course as Agricultural Economics 215B.)

215C. Economic Development in Agriculture: Policy and Planning (4) III. (Agricultural Economics) Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations; its role in economic development; agriculture and national planning; sector policies relative to prices, income, productivity, and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Agricultural Economics 215C.)

215D. Development Planning Process (4) III. The Staff Lecture—3 hours: discussion—1 hour. Prerequisite: courses 200B, 215A, 215B. Analysis of development plans, sectoral or regional programs and policies.

NOTE: For key to footnote symbols, see page 133.
Application of macroeconomic models, input-output. Social Accounting Matrix (SAM) and programming techniques. Analysis and case studies of methods of project evaluation. (Same course as Agricultural Economics 212.)

216. Economic Systems (4) I. Brzeski Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance under conditions of limited governmental interference.

217. Economics of Planning (4) I. Brzeski Lecture—4 hours. Theories and principles of economic planning under various economic systems.

219. Marxist Economic Theory (4) II. Roemer Lecture-4 hours. Prerequisite: course 205B. Theory of exploitation and class, developed using a general equilibrium model; arguments for private property and rebuttals against; labor markets and capital markets; a capitalist economy; theory of public ownership.

220A. Monetary Policy (4) 3. Mayer Lecture—4 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, the problem of lags, alternative policies.

220B. Econometric Methods (4) II. Burt (Agricultural Economics) Lecture—4 hours; term paper. Prerequisite: Statistics 191B or 131B, Mathematics 22A. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Agricultural Economics 240A.)

220C. Econometric Theory (4) II. Seeger Lecture—4 hours; discussion—1 hour. Prerequisite: course 204A; Statistics 131A, 131B, 131C recommended. Multivariate analysis, specification analysis, simultaneous equations models, identification, estimation methods, small sample properties. (Same course as Agricultural Economics 240B.)

220D. Topics in Econometrics (4) II. Cameron Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Advanced topics in nonlinear econometric modeling. Contents may vary from year to year. (Same course as Agricultural Economics 240D.)

225A. Labor Economics (4) II, III. The Staff Lecture—3 hours; discussion—2 hours. Prerequisite: one year of law school; course 200A or consent of instructor. Studies the effects of legal rules on resource allocation and applies economic analysis to explicate problems in torts, property, and contracts.

225B. Urban Economics (4) III. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: course 200A or 204. Explains development of cities and land-use patterns within cities. Explores efficiency and equity effects of local spending and taxes. Analysis of urban problems such as transportation (congestion, pollution, mass transit), crime, and inadequate housing.

230A. Public Economics (4) II. Nelson Lecture—3 hours; discussion—1 hour. Prerequisite: course 204B. Studies the effects of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; evaluation of effectiveness of tax incentives.

230B. Public Economics (4) III. Helm Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B. Effects of tax policies on economic behavior: production, consumption, saving, investment, and labor supply. Distribution and equity, social welfare evaluation and the measurement of inequality.

235C. Policy Analysis (4) III. Mayer Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D (may be taken concurrently). Focuses on relation between changes in money supply and changes in real GNP. Also discusses the effect of changes in money supply on interest rates.

235A. Monetary Theory (4) II. Hoover Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Emphasizes problem of finding an appropriate place for money in microeconomogenic equilibrium models. Consideration given to meaning of money, its role in inflation and the real economy and its role in models of finance.

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and graduate standing. (SU grading only.)

299C. Individual Study (1-12) I, II, III. The Staff (SU grading only)

299D. Dissertation Research (1-12) I, II, III. The Staff (SU grading only)

397. Teaching of Economics (2) I. Walton Lecture-discussion—2 hours. Prerequisite: graduate standing in economics. Teaching of economic methods of instruction, organization of courses, examination and evaluation procedures. (SU grading only.)

Education

(Murray, College of Letters and Science)

Henry T. Trueba, Ph.D., Director of the Division and Associate Dean of the College of Letters and Science (168 Kerr Hall)

G. Philip Cartwright, Ph.D., Associate Director of the Division
Barbara G. Goldman, Ph.D., Special Assistant to the Director
David R. Wampler, Ph.D., Head of Teacher Education
Jon Wagner, Ph.D., Director of University-School Programs and of the Center for Cooperative Educational Research
Division Office, 180 Kerr Hall

Faculty

Donald G. Armstrong, Ph.D., Professor
Hugh C. Black, Ph.D., Professor Emeritus
G. Philip Cartwright, Ph.D., Professor
Vincent A. Crockenberg, Ph.D., Lecturer
Linnea C. Ehri, Ph.D., Professor
Richard A. Figueroa, Ph.D., Professor
Maryann Gatheral, B.A., Lecturer in and Supervisor of Teacher Education
Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education

Education, Applied Behavioral Sciences)

Jacque E. Lowry, M.A.T., Lecturer in and Supervisor of Teacher Education
Barbara F. Meir, Ph.D., Associate Professor
Douglas L. Minnis, Ed.D., Senior Lecturer
Susan A. Ostergard, Ed.D., Lecturer in and Supervisor of Teacher Education
Victor A. Penken, Ed.D., Lecturer in and Supervisor of Teacher Education

Jonathan H. Sandoval, Ph.D., Professor
Julius M. Sassenrath, Ph.D., Professor
S. Joan Skinner, M.A., Lecturer in and Supervisor of Teacher Education

Carroll J. Spring, Jr., Ph.D., Professor
Loray F. Trombley, Ph.D., Professor Emeritus
Henry T. Trueba, Ph.D., Professor
David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education
George D. Yone, Ph.D., Professor

University-School Programs Staff

Mara Renee Goodman, Ph.D., Coordinator of Publications, Center for Cooperative Educational Research
Jim Hahn, M.A.T., Associate Director for Teacher Research, Center for Cooperative Educational Research
Judith Kyth, M.A., Director, Northern California Mathematics Project
Keith R. Prior, B.A., Director, Northern California Curriculum Consultant Project
Paul Moreau, M.S., Coordinator, Northern California Science Project
Michael Moore, M.A., Consultant, Northern California Science Project
111. Introduction to Psychopedagogics (4) I, II, Ill, Yonge
Lecture-discussion—4 hours. Prerequisite: Psycholo-

gy 1 and upper division standing. Introduction to the

human science of pedagogics (education) with spe-
cial emphasis on the psychology of education. Such

topics as the pedagogical situation, learning and

becoming, teaching and the lesson structure, and

the methods of pedagogics will be considered.

114. Quantitative Methods in Educational

Research (4) I, Yonge
Lecture-discussion—4 hours. Prerequisite: two years

of high school algebra. Problem and methods in data

analysis. Design of research projects. Some consider-

ation of procedures related to digital computers.

115. Educating Handicapped Children (2) II, III,

Cartwright, Figueroa, Spring

Lecture—2 hours. Prerequisite: upper division stand-
ing. Educational issues and processes involved in

teaching handicapped children.

117. Psychology of Reading (4) I, Ehrli

Lecture-discussion—4 hours. Prerequisite: Psycholo-

gy 1 and upper division standing. Theory and

research on psycholinguistic processes involved in

learning to read. Topics include reading readiness,

word recognition and spelling, knowledge of the

categorical system, phonological awareness, inter-

active processes, influence of dialect, difficulties of

poorer readers.

118. Comprehension in Reading and Listening (4) II, Spring

Lecture-discussion—4 hours. Prerequisite: upper divi-

sion standing. Study of comprehension and the

process of understanding written and spoken materi-

al. Topics include vocabulary acquisition as well as

instruction of verbal skills at the sentence and

paragraph levels.

120. Philosophical and Social Foundations of

Education (4) I, II, Ill, Armstrong and staff

Lecture-discussion—4 hours. Prerequisite: upper divi-

sion standing. Philosophical, historical, and soci-

ological study of the education and the school in our

society. General Education credit: Civilization and

Culture/Non-Introductory. Recommended GE prepa-

ration: History 179 or Philosophy 14.

122. Civil Rights of Teachers and Students (4) I, III,

Crockenog

Discussion—4 hours. Prerequisite: upper division

standing. Rights of teachers and students under the

U.S. and California Constitutions and Federal and

State laws. Emphasis on the rights of speech, press

and assembly, religious autonomy, due pro-

cess, equal protection and privacy. General Educa-

tion credit: American Institutions/Non-Introductory.

Recommended GE preparation: Political Science 1.

123. John Dewey and the Foundations of Educa-

tion (4) II, Armitage

Lecture-discussion—4 hours. Prerequisite: upper divi-

sion standing. The philosophical and social foun-

dations of education as interpreted by Dewey. While

focusing on his critique of American education and

his systematic proposals for reform, attention will

also be given to criticisms of Dewey.

130. Issues in Higher Education (4) II, III, Crocken-

groo, Armstine, Milton (Mathematics)

Discussion—3 hours; field work—3 hours. Prerequi-

site: upper division standing or consent of instructor.

Analysis of current issues in higher education and of

some practical implications of varying philosophical

approaches to the role of the university.

132. Church, State and School (4) II, III, Crocken-

groo

Discussion—4 hours. Prerequisite: upper division

standing, course 122 or the equivalent. Analysis of

the decisions of the United States Supreme Court

applying the free exercise and establishment clauses

of the Federal Constitution to the relationship be-

tween church, state, and schools. General Education cre-

dit: Contemporary Societies/Non-Introductory. Recom-

mended GE preparation: Political Science 1.

142. School Desegregation and the Civil Rights

Movement (4) I, Crockenogroo

Discussion—4 hours. Prerequisite: upper division

standing; course 122 or an equivalent course

emphasizing legal analysis. The law of school deseg-

regation and its development in the context of the

broader movement for civil rights led by Martin

Luther King, Jr., with particular attention to the his-

tory of school desegregation in California.

145. Aesthetics in Education (4) I, II, Artz, Armitage

Lecture-discussion—4 hours. Prerequisite: upper divi-

sion standing. Considers the role of the arts in

education. Examines various conceptions of the

nature of art and aesthetic experience, and relates

this to instructional procedures.

150. Tutoring Children and Youth (2) I, III, The

Staff (Director in charge)

Lecture—1 hour; tutoring or teacher aide—3 hours.

Prerequisite: upper division standing. Planning,

choosing, and implementing strategies for tutoring

or working as a teacher's aide in schools. Analysis of

factors that affect pupil performance in schools. May

be repeated twice for credit when tutoring is done in

different major areas.

151. Language Development in the Chicano Child

(3) I, Merino

Lecture—3 hours. Prerequisite: some knowledge of

Spanish and linguistics. First and second language

acquisition, bilingual education, language assess-

ment. Chicano Spanish, and the role of dialect vari-

eties in the classroom.

152. Communication Skills for Bilingual Teachers

(3) Ill, Merino, Minnis, and staff

Lecture-discussion—2 hours; field work—3 hours.

Prerequisite: course 151; Spanish 2, BA-BB. The
development of communication skills of prospective

educators with an emphasis on the study and use of

standard Spanish and Southwest Spanish dialects in

teaching science, mathematics, social science, music,

art, and language arts to bilingual elementary

school pupils.

153. Cultural Diversity and Education (2) Ill,

Minnis, Minnis, and staff

Lecture-discussion—2 hours. Prerequisite: upper divi-

sion standing. Analysis of research in learning

styles among culturally diverse students with review

and evaluation of responsive curricula and class-

room teaching techniques. The ethnographic inter-

view as a research tool.

160. Peer Counseling (2) I, II, The Staff

Lecture—2 hours. Prerequisite: upper division stand-

ing; consent of instructor. Study of peer coun-

selling techniques and development of peer coun-

selling skills. (PINF grating only)

162. Guidance and Counseling (4) Ill, Figueroa,

Sandovai, and staff

Lecture—4 hours. Prerequisite: course 110 (may be

taken concurrently). Nature and scope of pupil ser-

vices; basic tools and techniques of guidance;

theory and practice of counseling psychology,

with emphasis on educational and vocational adjust-

ment.

175. Critical Thinking in Classrooms (4) Ill,

Minns, Friedman (Philosophy)

Lecture—2 1/2 hours; discussion—1 1/2 hours. Prere-

quisite: upper division standing. Critical thinking

skills and rigorous analysis of argumentation in

classrooms on the basis of philosophical and ed-

ucational theory. Enables teachers to utilize existing

school curricula to engage children in discussions of

significant scientific, social, ethical, and philosop-

hical issues.

180. Computers in Education (3) I, Ill, Cartwright

and staff

Lecture—1 hour; seminar—1 hour; laboratory—3

hours. Prerequisite: upper division standing. Ap-

lications of computers to instruction; the instruc-

tional, intellectual, and communication tools.

192. Internship (1-5) I, II, III. The Staff (Director in

charge)

Discussion—1 hour; field work—3 to 15 hours; term

paper. Prerequisite: upper division standing; consent
of instructors. Work-learning experience in schools under supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only)

Graduate Courses

200. Educational Research (3) III. Spring, Eth Seminar—3 hours. Prerequisite: course 114 or the equivalent. Study of educational research and evaluation designs, review of computer solutions to related statistical procedures. Case problems. Problems provide practice in designing and reporting research.

201A. Ethnographic Research in Schools I: Current Theory and Practice (4) II. Trueba
Lecture—4 hours. Prerequisite: graduate standing. Review of current literature from anthropology and society related to schools, with emphasis on the organizational structure of institutions and the analysis of face-to-face interaction. Will explore the relationships between these fields and research and theory development on the acquisition of knowledge in specific social and cultural contexts.

201B. Ethnographic Research in Schools II: Field-Based Research Projects (4) III. Trueba
Discussion—4 hours. Prerequisite: standing and course 201A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and interpretation by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects.

205. The Concept of Mind in Teaching (4) III. Armsline
Seminar—4 hours. Philosophical analysis of the problems of educational practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking.

207. Concepts of the Curriculum (3) I. Armitage, Crockenberg
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis in the examination of curriculum theory and practice, including the conceptual analyses of purposes, of the organization of subject matters, and the methods of instruction.

208. Education and the Law (4) II. Crockenberg
Seminar—4 hours. Prerequisite: graduate standing. Analysis of how selected areas of school law have developed, in particular the rights of students and teachers under the Fourteenth Amendment to the U.S. Constitution, criticism of the present state of that law, and an understanding of needed legal reforms.

208. Pedagogics (4) III. Yonge
Seminar—4 hours. Critical analysis of the literature available in English dealing with theoretical and practical issues in education in terms of pedagogics (i.e., an existential phenomenological approach to the educational process).

211. Psychopedagogics (4) II. I. Yonge
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological aspects of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

212. Language and Intellectual Development (4) III. E. Hall
Seminar—4 hours. Prerequisite: consent of instructor. Theory and research on the development of language and thought in children; emergence of grammatical, semantic systems, and operational thought; implications for teaching.

213. Individual Assessment (4) II. Sandovai
Lecture—4 hours. Prerequisite: courses 114 and 219, admission to school psychology credential program. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the Stanford-Binet, the McCarthy Scales of Children's Ability.

214. Assessment of Children's Personality (4) II. Sandovai
Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 213 and 216; and familiarity with basic personality theory and theories of motivation. Study of the projective hypothesis: concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment of social and affective functioning; specific measurements in personality assessment; reporting on personality assessments; school interventions. Offered in even-numbered years.

215. Motivation and Behavior Modification (4) I. Spring
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Factors related to influencing behavior in educational settings, including analyses of intrinsic and extrinsic motivation, psychological resilience, achievement motivation, achievement attribution, and behavior modification.

218. Testing Minority Children (4) III. Figueroa
Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizing techniques and tests that are appropriate for use with Hispanic students. The use of multilingual multicultural assessment. Review studies and guidelines regarding the use of tests with minority children.

219. Educational Testing and Evaluation (3) II. Sassenrath
Seminar—3 hours. Prerequisite: courses 114 and 200 or consent of instructor. Test theory as it applies to research and evaluation in education, with an emphasis on general ability and reading tests.

251. Research in Bilingual and Second Language Education (3) III. Memo
Seminar—3 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals, second language teaching methods, language use models in bilingual education, interaction analysis in bilingual/cross-cultural classroom, use of the vernacular in classroom.

252. Multicultural Teaching and Curriculum (3) III. Memo
Seminar—2 hours; field work—3 hours. Prerequisite: graduate standing or consent of instructor. Cross-cultural research, 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.

253. Language and Literacy in Linguistic Minorities (3) III. Memo
Seminar—2 hours; field work—3 hours. Prerequisite: familiarity with another language and culture, graduate standing. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum.

270A. Reading Diagnosis and Prescription (3) III. Gathier
Lecture-discussion—3 hours. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities and the recognition of reading abilities. Analysis of the techniques, testing, use of material and teaching procedures.

270C. Clinical Laboratory and Seminar in Reading Problems (5) II—III. Gathier
Seminar—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic. (Deferred grading only, pending completion of two-quarter sequence.)

271. Recent Developments in Social Studies Education (3) III. McMahon
Lecture—4 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

272. Recent Developments in Science Education (3) II. Perkes
Lecture—3 hours. Prerequisite: consent of instructor. Analysis of contemporary science programs with special emphasis upon philosophical, psychological and pedagogical attributes of their design; trends, issues, and research in science curriculum and instruction.

273. Research in Mathematics Education (3) III. Ostergard
Lecture-discussion—3 hours. Review of current issues and research in mathematics education.

275. Effective Teaching (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.

277. Staff Development and Supervision of Teachers (4) III. Minnis
Seminar—4 hours. Prerequisite: graduate standing. Use of research and legislative guidelines to design staff development for school personnel. Emphasis on school change resulting from staff development programs and the supervision techniques. Supervision as a diagnostic skill and means of teaching teachers skills. Offered in odd-numbered years.

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 grading only.)

298. Group Study (1-5) I, II, III. The Staff (Director in charge)
(SU grading only)

299. Individual Study (1-6) I, II, III. The Staff (Director in charge)
Independent study—3—18 hours. Individual study under the direction of a faculty member. (SU grading only.)

299D. Research (1-6), I, II, III. The Staff (Director in charge)
Independent study—3—18 hours. Research for individual graduate students. (SU grading only)

Professional Courses

300. Reading in the Elementary School (4) I.
Gathier, Skermer
Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes developing skills with a specific emphasis on phonics, comprehension skills, study skills, and reading in the content areas.

301. Reading in the Secondary School (4) II, III.
Gathier and staff
Directed study—4 hours. Prerequisite: must be teaching or student teaching. Principles, procedures, and materials to help secondary school teachers improve the reading comprehension of their students. The teaching of phonics, structure, analysis, and alternative methods of coping with the problem reader in the classroom.

302. Language Arts in the Elementary School (2) I.
Skrermer
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) II. The Staff (Director in charge). Lecture-discussion—2 hours; laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Principles of art in the arts throughout participation. Development of concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-disciplinary explorations.

304A. Teaching in the Elementary Schools (5-8) I, II. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; studio teaching—15-30 hours. Prerequisite: course SQAG; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Current concepts of elementary school curriculum, emphasis on cognitive, affective, and physical sciences. Emphasis on affective teaching methods.

304B. Teaching in the Elementary Schools (5-8) II. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course SQAG; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Current concepts of elementary school curriculum, emphasis on cognitive, affective, and physical sciences. Emphasis on affective teaching methods.

304C. Teaching in the Elementary Schools (5-8) III. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Emphasis on social, biological, and physical sciences. Effective teaching methods.

305A. Teaching in the Middle Grades (5-8) I. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Emphasis on social, biological, and physical sciences. Effective teaching methods.

305B. Teaching in the Middle Grades (5-8) II. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course SQAG; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Emphasis on social, biological, and physical sciences. Effective teaching methods.

305C. Teaching in the Middle Grades (5-8) III. The Staff (Wampler in charge). Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course SQAG; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in junior high school. Emphasis on social, biological, and physical sciences. Effective teaching methods.

306A-306B-306C. Teaching in Secondary Schools (5-9) I, II, III. The Staff (Wampler in charge). 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 communications; constructing goals and objectives; assessment of learning; special problems of secondary school instructional 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.


308. Methods in Elementary Social Studies (2) II. Wampler, John. 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) III. Skinner. Lecture—3 hours. Prerequisite: upper division or professional standing. Methods, materials, and history of educational programs for the preschool through primary grades. Development of curricular methods and materials which stress integration of appropriate subject areas, socio-cultural, creative, physical, and cognitive development.

313. Secondary Art Methods (3) I. The Staff (Director in charge). Lecture-discussion—2 hours; laboratory—3 hours. Prerequisite: major in secondary teaching specialty, or consent of instructor. Current readings and discussion of contemporary art and teaching. Formulation of curriculum and practice of techniques used in secondary schools. Observation and evaluation of secondary art programs.

322. Methods in Secondary Social Studies (4) I. 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.


324. Teaching Methods in Mathematics (3) III. The Staff (Director in charge). Lecture—3 hours. Prerequisite: acceptance into a teacher education program; student teaching concurrently; a mathematics background or consent of instructor. Methods and curriculum for teaching mathematics at the secondary level (grades 9-12). Review of innovative mathematics programs in the State.

341. Teaching in Colleges and Universities (3) III. Minnis. Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in any department or program. Analysis of course objectives. Teaching techniques for college and university courses on lecture and discussion. Evaluation of student performance and grading. Course and instructor evaluations. (S/U grading only.)

342. Teaching Practicum for International Students (3) II. Lecture-discussion—2 hours. Prerequisite: graduate standing in any department or program. Intended for international students. Teaching techniques for college instruction with special recognition of language and cultural differences experienced by international instructors. Information on and practical experience with the organization and oral presentation of college-level subject matter. (S/U grading only.)

351. Advanced Fieldwork in Bilingual Education: Teaching (3-3-0) I, II. The Staff (Merino in charge). Seminar—2 hours; field work—0-9 hours. Prerequisite: acceptance into a bilingual education specialization 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, multicultural lesson planning, selection and use of bilingual/cross-cultural materials.

352. Advanced Fieldwork in Bilingual Education: Evaluation and Supervision (3-0-3) I, II. The Staff (Merino in charge). Seminar—2 hours; field work—3-9 hours. Prerequisite: upper division standing; acceptance into a bilingual/cross-cultural specialist credential program. Provides opportunity to acquire evaluation and supervisory skills in the field under the supervision of University staff and former program participants. (S/U grading in bilingual/cross-cultural education.)

361A-361B-361C. School Psychology: Introduction (3-3-3) 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. (S/U grading only.)


370. Advanced Fieldwork in Reading (2-6) I, II, III. Gathert. Seminar—1 hour; fieldwork—3-15 hours. Prerequisite: acceptance into a reading credential program. Fieldwork at elementary/secondary levels, using diagnostic/prescriptive techniques, and studying district in-service programs. May be repeated twice for credit up to a total of 6 units. (S/U grading only.)

389. Logo Programming in Education (2) II. Spring. Lecture—1 hour; laboratory—2 hours. Prerequisite: consent of instructor. Computer programming in Logo, a high-level computer language which is appropriate for instruction in elementary and secondary grades.

398. Group Study (1-5) I, II, III. The Staff (Director in charge). (S/U grading only.)

399. Individual Study (1-5) I, II, III. The Staff (Director in charge). (S/U grading only.)

Education Abroad Program
Caroline F. Wall, Ph.D., Campus Coordinator, Assistant Vice Chancellor for International Programs, 150 Mark Hall, 916-752-0392
Program Office, 323 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 different cultures 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 substantial knowledge from first-hand academic and practical experience. The same is true for students of foreign affairs. All students, whatever their field of study, will broad-
on their outlook and gain new skills as the result of study in a foreign country. The academic, and non-academic—debts and credits of participation in the EAP should be weighed carefully prior to departure, however.

Application

Normally, students participate in the program during the fall or spring semester, 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.

Application forms are available from the EAP Office. A provisional academic planning form, prepared in consultation with the EAP Adviser 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.

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 will have accumulated more than 145 units prior to the beginning of their planned year 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 take appropriate courses dealing with the subject of their major 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 returnees. Among other things, academic goals, knowledge of the host country and the United States and proficiency in the language of the host country, when available, will receive considerable 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 very important. To aid adjustment of UC students to different, often unfamiliar educational practices and values, a part of the academic program of most centers. Tutorials also assist in overcoming language problems and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

To allow students to pursue 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 introductory course in the language of the host country (except for the programs in the United Kingdom, Ireland, Canada, Australia, Egypt, Ghana, Hungary, Kenya, 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 academic 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 academic requirements. The approval of the proposal is on a case-by-case basis. The provisional planning form is intended to take care of this, but a few potential problems deserve emphasis.

In case a department or program requires credit for the semester, the major and program requirements 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 meet the University residency requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy residency requirements within the final 45 units of study at Davis. Otherwise, subject to prior approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 55 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 expect to graduate upon completion of the year abroad should file for candidacy to receive the degree. In September, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returnees to 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 institutions has special areas of excellence and a 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 certain special programs, such as the UC Davis exchange with French language universities in Quebec. 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 intensive language course at Georg-August University in Goettingen, Germany, precedes the beginning of the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Baltics, Soviet Union), fine arts (history of art, music, theatre 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 examinations 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, Grenoble, and Paris.

University of Bordeaux. Areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

University of Grenoble. Mainly in the social sciences through the Université des Sciences Sociales (Grenoble I); some humanities. Often one year of 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, critical theory, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

Pau-Pau. Participants spend the first semester at the University of Pau. At the end of January, they move to Paris to take courses at the 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-Pau core courses, humanities, social sciences. Program in Basque studies is of special interest. Scholarships available for students in Basque or Navarre.

University of Poitiers. Humanities is taught, with major emphasis in history and medieval studies; mathematics; physics;

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. Karl Marx University, Budapest. A fall or a spring program developed for the first time to offer a student the opportunity to study in the Central European history, culture, economics, and economic history.

Italy. A compulsory intensive language program and history preceded the beginning of the academic year.

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). All courses are not available for UC students.

University of Venice. Economics, history; history of art.


NOTE: For key to footnotes symbols, see page 138.
Accademia delle Belle Arti di Venezia, Venice. Art studio and some art history. Colored slides of portfolio of student work must be submitted for admission.

Il Bietore International School of Graphic Arts. Etching 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 of study is a single subject, usually the major or a closely allied field, for the entire year.

Portugal. A six-week summer intensive-language program at UC Santa Barbara is required before departure for the academic year program. Students enroll in courses taught through the Department for Foreign Students as well as regular offerings at the University of Lisbon.

University of Lisbon. Portuguese language, literature, and culture, classical and romantic languages, literature, and literary studies. Philosophy, geography, history, cultural anthropology.

Spain. A compulsory intensive language program precedes the beginning of the academic year. All institutions in Spain.

University of Alcala 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 one regular-year-long course in the University of Barcelona, (This is a cooperative program with University of Illinois.)

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 one regular-year-long course in the University of Madrid.

Sweden. Compulsory intensive language course during the fall for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Most courses are taught in Swedish, 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 15 institutions, is administered by a director and associate director located in London. The UK program is highly competitive, largely due to its popularity with students. Following selection for participation by the EAP administration, a student must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only. Participating schools include:

- England: University of Birmingham, University of East Anglia, University of Exeter, University of Hull, University of Kent at Canterbury, University of Lancaster, University of Leeds, University of Sussex, 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 St. Andrews, University of Strathclyde.
- Wales: University College of Wales at Aberystwyth.

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available.

USSR. Two semester programs are available, depending on language preparation. Students with two years of university-level Russian participate in a program developed for UC. Those with three years of university-level Russian may apply for a program organized by the Council on International Educational Exchange (CIEE) in a consortium of American universities in which UC participates. Both programs are primarily intended for language majors, but are open to students of literature, history, area studies, etc.

Leningrad State University. Russian language and civilization only.

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 language course precedes the beginning of the academic year. Study centers in Israel are administered by a University of California affiliated in Jerusalem, University of Haifa. Humanities and social sciences, with special emphasis on contemporary Israel and Arab-Jewish studies. Limited opportunities in the sciences. Special program in Underwater Archaeology. Courses are offered by the Department of Marine Studies Programs for Overseas Students offers a core curriculum in Jewish, Middle East and Israeli studies, social sciences, and history of modern Israel taught in English.

Hebrew University, Jerusalem. Broad curriculum: emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English. The program offers courses in Judaic, Israeli, Middle Eastern Studies, and a few courses in the general social sciences and humanities, science and business. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

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. The programs are taught in English and include 18 units of Mandarin or Cantonese in their annual program.

Chinese University of Hong Kong. Humanities and social sciences. 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 focusing on development in modern India and its culture and tradition, as well as continue their study of Hindi. During the second and third quarters, students will also take regular course work at the Delhi University.

University of Delhi. Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.

Indonesia. An eight-week summer intensive-language program at Gadjah Mada University in Yogyakarta. Students are required to complete two years of university-level Indonesian. This program requires more than one full term of Indonesian for continued study of the language, with additional courses in Indonesian and a culture course 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 courses.

Gadjah Mada University. Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.

Institute Seni Indonesia (ISI). The Indonesian Institute of Arts: visual arts, music, dance, theater, fine arts, etno-musicology.

Akademi Seni Tari Indonesia (ASTI) at Denpasar and Bandung. The Indonesian Dance Institute of Bali: dance, music, and theater.

University of Padjadjaran and Bandung. Development studies, environmental studies. All programs in Indonesian and social sciences are available.

Japan. Completion of one year of Japanese at the university level or the equivalent is required for acceptance. A compulsory intensive language course precedes the academic year. Students are expected to complete an additional 18 units of Japanese language during their year in Japan.

Doshisha University. Kyoto. Humanities and social sciences. Emphasis on Japanese language and culture. This center serves students having more advanced study of Japanese; at least two, preferably three, years of UC Japanese language study will be required.

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.

Peace 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.

Sophia University, Tokyo. Comparative culture studies, Japanese language and literature, history, political science, economics and business are available. Many are taught in English.

Tokyo Institute of Technology. Graduate students permitted to participate in Japanese research and take courses in science and engineering.

People's Republic of China. EAP offers a full-year program in Beijing and a fall semester program in Tianjin; a semester program in Nanjing is available through the Council on International Educational Exchange. Intensive language study in Chinese is the primary emphasis of all programs.

Nanjing University. This single-semester program concentrates on intensive language instruction with courses in Chinese history and contemporary culture. The prerequisite is one year of college-level Chinese.

Nanjing 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 focuses on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Department of Peking University. The prerequisite for the program is two years of college-level Chinese.

Taiwan, Republic of China. Students participating in the Chinese Language and Culture Studies 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 International Programs. Courses in art history, literature, economics, and political science are available. Prior course work in Chinese culture, history, and language are recommended.

This (is a cooperative program with California State University International Programs).

Thailand. An eight-week summer intensive language program at Chiang Mai University is required for all students. This is followed by a seven week inter-term program of continued study of the Thai language.

NOTE: For key to footnote symbols, see page 133.
with additional courses in Thai history and culture, taught in English. Most students will remain at Chulalongkorn University for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient language background (more than two years of University-level Thai language) have the option of enrolling at Chulalongkorn University in Bangkok for the second semester. Instruction is in Thai, though English options are available.

It is possible to apply for the summer intensive-language program only. Students may take more advanced language courses in subsequent years.

Africa

Ghana. University of Ghana, Legon-Accra. Open to undergraduate and graduate students. Instruction is in English. As in the British system, students take a year-long program of study in a single area. End-of-year examinations are given only once and are mandatory for credit to be awarded.

Offerings include humanities and social sciences, with emphasis on African studies. There is a strong program in ethnomusicology.

Kenya. Enrollment open to undergraduate and graduate students. As in the British system, students take a year-long program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit. (Since operation of the Center is unpredictable, interested students should contact the EAP Office in South Hall for the latest status report.)

University of Nairobi. Humanities and social sciences, with emphasis in African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, architecture, and design may associate with the Institute for Developmental Studies, Institute for African Studies, or the Housing and Research Development Unit.

Togo. Study and field experience (SFE). An eight-week summer program developed 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 five years 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.

University of São Paulo. Brazilian literature, Portuguese language, arts, humanities, social sciences. (This is a cooperative program administered by the Council on International Educational Exchange [CIEE].)

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 must leave 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 throughout the year, so higher academic programs are available. Students have the option of spending one semester (two UC quarters) at UNAM, or a full year.

Study and Field Experience (SFE) in Mexico. Available for either Fall or Spring Quartet, the SFE program begins in June and includes six weeks of intensive language courses and a course on contemporary Mexico. The final weeks of the program are spent doing volunteer work in a community outside of Mexico City to complement formal course work. Summer Intensive Language Quarter in Morelia. This program provides total immersion in Mexican society and Spanish language instruction for students who have completed one year of University-level Spanish before departure. It is not appropriate for advanced students in Spanish.

Peru. A compulsory intensive language course precedes the beginning of the academic year. All courses are taught in Spanish.

University of Caraballo, Lima. Humanities, social sciences. Anthropology, archaeology, and ethno-history are of special interest. (This is a program of the Peruvian Consulate, which is composed of Indiana University and a number of California universities.)

Canada

Students may enroll for a full year. Studies on the major or a closely allied field is 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 November. UC participants must leave 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 throughout the year, so higher academic programs are 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; Christchurch, the University of Otago in Dunedin, Massey University in Palmerston North, and Victoria University in Wellington. All academic disciplines are available; programs in textiles and a variety of agricultural sciences are of special interest.

Endocrinology (A Graduate Group)

Donald L. Curry, Ph.D., Chairperson. The Graduate Group offers programs of study leading to the M.S. and Ph.D. degrees. The M.S. degree is offered under Plan I (thesis) of the master's program. Detailed information regarding graduate study is available through the Graduate Adviser. See also the Graduate division section in this catalog. Graduate Adviser. Contact the Program Office.

Courses in Endocrinology

Graduate Courses


220. Endocrinology Literature Critique (1) Ill. Torger.

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.)


Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Current and near-future uses of "state-of-the-art" personal computers and local area networks. Applications in the Life Sciences. Running programs on Macintosh IIX and 80386-based PC-compatible computers and on 3-Com local area network in Endocrinology Graduate Group Computer Laboratory.

240. Biochemical Endocrinology (3) III. Adams (Animal Science).

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and molecular and cell biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, second messenger phenomena, and hormonal control of gene expression.

252. Seeleiner (1) I, II, III. The Staff (Chairperson in charge).

Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit. (SU grading only.)

269. Group Study (1-5) I, II, III. The Staff (Chairperson in charge).

Prerequisite: consent of instructor.

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

Graduate Study. The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.S. and Ph.D. degrees. The M.S. degree is offered under Plan I (thesis) of the master's program. Detailed information regarding graduate study is available through the Graduate Adviser. See also the Graduate division section in this catalog. Graduate Adviser. Contact the Program Office.

Engineering

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Undergraduate Study
Fifteen undergraduate engineering curricula, including four formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, Mechanical Engineering, Atmospheric Science and Engineering, and Computer Science and Engineering curricula are seven programs which have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, the nationally recognized accrediting body for engineering curricula.

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

Graduate Study
See the Graduate Division section of this catalog. For additional information refer to the College of Engineering Bulletin, obtainable from the Dean's Office, or phone the Graduate Study Office at 916-752-0692.

Lower Division Programs
If you enter the College of Engineering with fewer than 84 quarter units of credit, follow one of the four Lower Division Programs shown below. The first program (I) is common to majors in Aeronautical Science and Engineering, Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and combinations of these majors; (II) is for those majoring in Agricultural Engineering and the three Agricultural Engineering options: Aquacultural and Fisheries Engineering, Food Engineering, and Forest Engineering; the third (III) is for those majoring in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering; and the fourth (IV) is for those majoring in Computer Science and Engineering, Electrical Engineering and the double major Electrical Engineering/Materials Science and Engineering.

The lower division program for students who enter the College with 84 or more quarter units of credit is explained in the College of Engineering catalog, under "Admission to Advanced Standing."

Lower Division Program I
Requirements for Aeronautical Science and Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Mechanical Engineering/Materials Science majors only.

<table>
<thead>
<tr>
<th>Course</th>
<th>Required Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus, Mathematics</td>
<td>1-2-3</td>
<td></td>
</tr>
<tr>
<td>Linear algebra</td>
<td>1-2-3</td>
<td></td>
</tr>
<tr>
<td>Differential equations</td>
<td>1-2-3</td>
<td></td>
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<tr>
<td>Vector analysis</td>
<td>1-2-3</td>
<td></td>
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<tr>
<td>General physics</td>
<td>1-2-3</td>
<td></td>
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<tr>
<td>Chemistry</td>
<td>1-2-3</td>
<td></td>
</tr>
<tr>
<td>Introduction to engineering</td>
<td>1-2-3</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 53.
Upper Division Programs
If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 84 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

Aeronautical Science and Engineering
Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture and operation of aircraft. The program leading to the Bachelor of Science degree in Aeronautical Science and Engineering is designed to provide a broad background and fundamental knowledge in the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare the student for immediate employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose aerodynamic aspects are governed by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sport equipment and all general aviation systems.

However, aeronautical science and engineering usually limits its subject matter to atmospheric studies, as does the undergraduate curriculum at UCD. The fundamental engineering disciplines are supplemented with courses in aircraft propulsion, aerodynamics, aircraft performance, stability and control, aircraft preliminary design, and aeronautical structures.

A broad range of technical elective courses is available. Some students choose their electives from one area of study in order to begin developing a specialty. Others choose courses from several areas in order to broaden their background in the sciences and engineering. Typical aeronautical science and engineering specialties include aerothermodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, flight testing, or component and mechanism design. In any case, it is recommended that students consult with their adviser before selecting technical electives.

There are a number of electives which could be recommended to all aeronautical science and engineering students regardless of their chosen area of specialization. These include:

- Engineering 102A, 105L, 106, 118, 122, 190
- Aeronautical Science and Engineering 131, 135, 137, 138B, 138L
- Materials Science and Engineering 140, 142
- Mechanical Engineering 150A, 150B, 150L, 162, 172, 184A, 184B, 186, 187
- Electrical and Computer Science Engineering 150
- Applied Science Engineering 115

Civil Engineering 131A

Aeronautical Science and Engineering
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)
Minimum units required for major: 192

Subject Areas and Courses
Electronic circuits—Engineering 100 ................. 4
Applied mechanics—Engineering 102A, 102B, 103A, 103B, 104A, 104B
Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165 ................. 10
Fluid mechanics—Engineering 103A, 103B,
103L .......................... 7
Aeronautical engineering fundamentals—Aeronautical Science and Engineering 125 ................. 3
Aerodynamics—Aeronautical Science and Engineering 126, 127 .......................... 8
Aircraft preliminary design—Aeronautical Science and Engineering 134 .......................... 4
Aeronautical structures—Civil Engineering 131B, Aeronautical Science and Engineering 135 .......................... 6
Measurement systems—Mechanical Engineering 176 .......................... 3
Controls and system analysis—Mechanical Engineering 171 .......................... 4
Applied mathematics—Engineering 180 .......................... 3
Technical electives .......................... 10

Humanities—Social Sciences electives and/or General Education electives .......................... 15

Total Units for Upper Division Program .............. 102

Agricultural Engineering
Combine a broad general training in engineering with a basic understanding of biological phenomena and you have the preparation for a challenging and socially useful career.

Agricultural engineers create systems, equipment, and processes for the production and utilization of biological materials. They integrate a cross section of engineering disciplines, with special attention to the interface between physical systems and biological products. Agriculture (including nursery and greenhouse excellence), food processing and manufacturing, timber production and forest management, and aquaculture are among the many areas agricultural engineers are prepared to serve. Each area is involved with producing, handling, packaging, storing and transporting biological materials. The practice of agricultural engineering requires an understanding of the properties and behavior of the biological materials and the knowledge to control their environment, thereby creating optimal conditions for biological activity.

Agricultural engineers often work in interdisciplinary teams with biological scientists and other engineering specialists. The growth of biotechnology, environmental issues, and concern for the interface of human beings with engineering systems have created new and exciting opportunities. Agricultural engineers are needed to provide engineering solutions for taking the advances in the biological sciences out of the laboratory and into the real world.

The program allows students to select one of four curricula, depending on their specific interests, while it retains the versatility to adapt to careers in several areas. All curricula share a common lower division program and a common core of courses in the upper division. The first upper division curriculum (1) provides a general program in Agricultural Engineering, with the opportunity to focus on a particular area of interest. The remaining curricula provide options for:

- (2) Aquacultural Engineering
- (3) Food Engineering
- (4) Forest Engineering.

Agricultural Engineering
Curriculum 1
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)

Agricultural Engineers are concerned with the production, processing, packaging, and use of biological materials. This program requires the integration of engineering with a spectrum of biological disciplines and creates the opportunity for many areas of specialization, depending on student interest.

For example, irrigation and drainage specialists apply engineering principles in the design and operation of water systems for biological production. Structures and environmental specialists design structures to provide optimum environments for plant production in greenhouses, products storage and conditioning, and animal production. Power and machinery specialists design, develop, and apply machinery and energy systems for crop production and processing. Electronics and electrical systems specialists develop sensors, instrumentation, and control systems for monitoring and controlling production environments and post-harvest processes.

The senior year design project provides students with an opportunity to focus on an area of special interest. Additional courses in this area can be selected with the help of an adviser.

Upper Division Requirements
Minimum units required for major: 190

Subject Areas and Courses
Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 105B ................. 8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A .......................... 18
Engineering economics—Engineering 106 .......................... 3
Mathematics—Applied Science Engineering 115 or Engineering 180 ......................... 3
Statistics—Civil Engineering 114 .......................... 3
Agricultural engineering—Agricultural Engineering 114, 125, 132 and 145 .......................... 14
Engineering design ......................... 11
(a) Agricultural Engineering 170A, 170B, and 170C .......................... 12
(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A .......................... 12
Professional responsibilities—Engineering 107 .......................... 3

Humanities—Social Sciences electives and/or General Education electives .......................... 16

Biological and agricultural sciences .......................... 9

Required technical courses .......................... 11
Agricultural Engineering 112, Civil Engineering 141, 141L, Engineering 111 .......................... 11

Total Units for Upper Division Program .............. 99

Aquacultural and Fisheries Engineering
Curriculum 2
Aquacultural and fisheries engineers are involved in the design, fabrication, and management of equipment and facilities for culturing and handling aquatic plants and animals. Maintenance of proper habitat and environmental conditions, both in controlled aquaculture operations and in natural fishery settings, is a primary consideration.

Upper Division Requirements
Minimum units required for major: 202

Subject Areas and Courses
Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 105B ................. 8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A .......................... 18
Engineering economics—Engineering 106 .......................... 3

NOTE: For key to footnote symbols, see page 133.
Forestry Engineering

Curriculum 4

Forestry Engineering is the application of engineering principles and knowledge in 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 useful products. Students study systems and equipment for timber harvesting, forest residue management, reforestation, forest recreational facilities, soil and water control and conservation, forest road and development materials handling, and other phases of forestry. This option is administered in cooperation with the Department of Forestry and Resource Management at UC Berkeley. All quarter of the junior year is spent on the Berkeley campus, following an eight-week summer field course sequence at the UC Forest Camp near Quincy. Students who transfer to the University from another institution to enter this program should apply for admission to the Davis campus even if they plan to attend the Berkeley campus before coming to Davis. These students, as well as those attending the Davis campus before going to Berkeley, obtain intercampus visitor status that authorizes them to register on the Berkeley campus for the semester to be spent on that campus. Application forms for intercampus visitor status are available from the Department of Agricultural Engineering.

Upper Division Requirements

Minimum units required for major: 212.5

Subject Areas and Courses

Electronic circuits and microprocessors—Engineering 100 and Agricultural Engineering 146.

Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A.

Engineering economics—Engineering 106.


Statistics—Civil Engineering 114.

Agricultural Engineering 10.

Agricultural Engineering 132, plus two courses from Agricultural Engineering, 114, 125, and 145.

Engineering Design.

(a) Agricultural Engineering 170A, 170B, and 170C.

(b) Select one course from Civil Engineering 130A, 145, Mechanical Engineering 150A.

Professional responsibilities—Engineering 190.

Humane-Scientific Electives and/or General Education electives.

Biological and agricultural sciences.

Biochemistry and Biophysics 101A, Chemistry 1B, Food Science and Technology 104, 111, 150 or 151.

Required technical courses.

Engineering 103B, 105B, 111, Mechanical Engineering 150A.

Total Units for Upper Division Program: 112.5

NOTE: For key to footnote symbols, see page 133.
Computer and Automation. This specialization offers the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, the student is exposed to the theory and practice of monitoring and operation of chemical processes using microprocessor-based control systems. The common ingredient in all these studies is the use of computer-based tools and expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yields, solving large numbers of equations on supercomputers to assist in the operation of processes, and implementation of plantwide control systems are all examples of chemical engineering endeavors based on extensive use of computers. The following list of elective courses is suggested to help the student obtain the necessary background in these areas.

Suggested technical electives:
- Artificial Intelligence and Computer Graphics: Computer Science Engineering 170, 175
- Mathematics 126B-C, 132A-B, 168
- Civil Engineering 153

Automatic Control:
- Electrical and Computer Science Engineering 150, 151, 157B
- Mechanical Engineering 176
- Food Science and Technology 156

Electronics Processing. Because the manufacture of semiconductor devices, integrated circuits, and magnetic memories, tapes, and disks involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces the student to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of such devices.

Suggested technical electives:
- Computer Science Engineering 140
- Chemical Engineering 153
- Physics 105A, 145B

Energy Engineering. This area of specialization is designed to introduce the student to the various energy sources and energy conversion methods.

Suggested technical electives:
- Agricultural Engineering 112
- Engineering 111, 112
- Mechanical Engineering 162, 163
- Resource Sciences 103

Environmental Engineering. The environmental engineering option prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena: chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science plus the usual chemical engineering analysis and design courses and courses on environmental topics prepares the student to seek employment with industry or government. For this specialization six courses should be selected from the following list.

Suggested technical electives:
- Air Environment
  - Strongly recommended: Civil Engineering 149A
  - Recommended: Atmospheric Science 121A, 121B, 158
  - Civil Engineering 242A, 242B, 244
  - Environmental Studies 110
  - Environmental Toxicology 101, 112A, 112B

- Water Environment
  - Strongly recommended: Chemical Engineering 161

Civil Engineering 149A, 149B
Microbiology 102 (instead of Physics 9D)

Recommended:
- Biochemistry and Biophysics 101A, 101B
- Civil Engineering 147, 240, 243A, 243B, 244, 245, 246A, 246B
- Environmental Studies 110, 151
- Environmental Toxicology 101, 112A, 112B
- Water Science 41

Food Process Engineering. This area of specialization prepares students to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:
- Strongly recommended: Microbiology 102 (instead of Physics 9D)
- Biochemistry and Biophysics 101A, 101B
- Chemical Engineering 161
- Agricultural Engineering 132
- Food Science and Technology 104, 104L, 111

Recommended:
- Food Science and Technology 150, 150L, 151

Marketing. Speciality chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in marketing, planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:
- Management 250, 251
- Agricultural Economics 113, 130, 136
- Psychology 185
- Statistics 103, and 32 or 102

Prebiomedical Engineering. This area of specialization is designed to prepare the student for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to provide space for Biological Sciences courses.

Suggested technical electives:
- Four to six courses from:
  - Anatomy 100, Biochemistry and Biophysics 101A, 101B, Biological Sciences 1A, 1B, 1C, 10, Physiological Sciences 101A, 101B, Physiology 110, 111A, 111B, 112, 113, 114

Premedicial. Inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including pre- and postgraduate) area of specialization should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on electives. To ensure that room is provided in the program for the biology courses, it is important to prepare a course schedule with a Chemical Engineering adviser early in the freshman year.

Suggested technical electives:
- Anatomy 100
- Chemistry 128C, 129B, 129C
- Six biology or biochemistry courses, such as Biochemistry and Biophysics 101A, 101B, Biological Sciences 1A, 1B, 1C, Genetics 100, Microbiology 102, Physiology 110, 112, 113, 114, Zoology 100.

Chemical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 193

Subject Areas and Courses

Engineering — Engineering 100, 106

Chemistry — Chemistry 110A, 110B, 110C

Advanced chemistry electives

To be selected from upper division courses in Chemistry and Biochemistry and Biophysics.


Technical electives

Hastings-Social Sciences, General Education electives

Total Units for Upper Division Program: 100

Chemical Engineering/Materials Science and Engineering

Minimum units required for major: 200

Subject Areas and Courses

Engineering — Engineering 100, 106


Chemistry — Chemistry 110A, 110B, 110C

Materials science — Materials Science Engineering 130, 132, 134, 138, and two courses chosen from Materials Science Engineering 140, 142, 144, 147, and three courses chosen from 132L, 134L, 138L, 140L, 142L, and 144L.

Humanities-Social Sciences electives and/or General Education electives

Total Units for Upper Division Program: 103

Civil Engineering

Civil engineering is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, and to providing aesthetically pleasing surroundings. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; food control; and large recreational facilities.

Areas of specialization within civil engineering include 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; however, such specialization is not required. While developing your individual program, you are urged to consult a faculty adviser.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering students are encouraged to include among their technical electives courses such as Economics 125A and 125B, Environmental Studies 160 and 166, Political Science 108, 109, and Sociology 143A or 143B. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

AREAS OF SPECIALIZATION:

Civil Engineering Planning. Specialization in this area is directed toward planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with courses in the humanities and social sciences.
Water Resources Engineering. This area includes study of hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipe 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 Engineering, 148
- Atmospheric Science, 120
- Civil Engineering 142
- Electrical and Computer Engineering 122
- Environmental Studies 126
- Geography 152
- Water Resources Engineering 110

Total Units: 180

Soil mechanics—Civil Engineering 171, 172, 173, 174, 175
- Hydrology and water resources—Civil Engineering 141, 141L, 141L
- Environmental—Civil Engineering 146A
- Civil Engineering 132B, plus any three courses from Civil Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one from Civil Engineering 134, 145, 148B, 152 or 173) Economics—Civil Engineering 106
- Engineering mathematical analysis—Applied Science Engineering 115, Civil Engineering 114, and either Applied Science Engineering 116 or Civil Engineering 131B or 153
- Materials science— Materials Science Engineering 132, 132L, 134, 134L, 136, 138L, and two courses from Materials Science Engineering 140, 142, 144, 147 or Civil Engineering 131
- Humanities-Social Sciences electives and/or General Education electives

Total Units for Upper Division Program: 94

Electrical Engineering and Computer Science (See also Computer Science)

The Department of Electrical Engineering and Computer Science administers three undergraduate curricula: Electrical Engineering, Computer Science and Engineering, and Engineering and Electrical Engineering. The Department, through the Division of Computer Science, also administers a Computer Science curriculum in the College of Letters and Science which is described in detail under the listing "Computer Science" in this catalog.

The upper division requirements for the degrees in Electrical Engineering, Computer Science and Engineering, and Engineering and Electrical Engineering are described below. Lower division requirements are listed under Lower Division Curricula at the beginning of the Engineering section. Please note that the lower division requirements for these majors differ from those of other Engineering curricula and are found in "Lower Division Program IV.

Electrical Engineering

Electrical Engineering involves the design, analysis, and effective use of electrical systems. Electrical engineers play central roles in nearly all aspects of modern life, including home entertainment, space exploration, medicine, communications, transportation, energy, industrial automation, defense, commerce, and education.

The Electrical Engineering curriculum combines a strong background in the scientific and theoretical aspects of electrical engineering with a practical knowledge of the design of electrical systems to prepare students both for careers in industry and graduate studies.

AREAS OF SPECIALIZATION:

The Electrical Engineering curriculum is designed to provide you with a solid background in mathematics and physical sciences, as well as in fundamental electrical engineering principles, including electromagnetics, physical electronics, and electronic circuits. Through the choice of upper division technical electives, you are able to concentrate on a topic of special interest. You may wish to consider one of the many specialized fields of electrical engineering. Examples of some of the possible specializations are circuits and electronics, signal processing, control engineering, power systems, automation, solid-state electronics, communication, lasers, and classical optics. You should select the elective courses leading to a specialization in consultation with a faculty advisor.

NOTE: For key to footnote symbols, see page 133.
Electrical Engineering and Materials Science and Engineering

In addition to the general Electrical Engineering curriculum, the Department of Electrical Engineering and Computer Science offers a double major in Electrical Engineering/Materials Science and Engineering. In this program, the student takes courses in both fields and graduates with an Electrical Engineering degree and a Materials Science and Engineering minor. This interdisciplinary approach prepares students for careers in industries that require a unique blend of electrical engineering and materials science and engineering skills.

Computer Science and Engineering

Computer Science and Engineering encompasses the organization, design, development, analysis, theory, programming, and application of digital computers. It spans the hardware-software spectrum and, thus, combines many aspects of computer science and computer engineering.

The Computer Science and Engineering curriculum has been designed to meet the demand for graduates with a broad education in the fundamentals of computer science and computer engineering. As a consequence, it is broader than either computer engineering or computer science, compared to computer engineering (i.e., the Electrical Engineering department with a specialization in computer design). It is distinguished by the additional study of software systems and computational theory.

Through the selection of upper division technical electives, students are able to emphasize either hardware or software design within the Computer Science and Engineering curriculum.

Minimum units required for major: 180.

Subject Areas and Courses

Circuits, systems, and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112...16
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 130A, 130B, 140A...9
Electrical Engineering breadth requirements—select nine units from Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112...16
Professional responsibilities—Engineering 190...1.3
Engineering science—Engineering 102A, 105A...6
Probability Theory—Statistics 120, 131A or Mathematics 131...4
Design electives—select six courses (at least two courses with a laboratory) from Electrical and Computer Science Engineering 114, 118, 132A, 132B, 144A, 144B, 150, 152, 157B, 161, 172, 175, 176, 177, 182A, 182B, Computer Science Engineering 110, 140, 142, 150, 160, 165, 168, 175 (may include approved 192 or 199 course)...
Additional technical electives...18
Humanities-Social Sciences electives and/or General Education electives...12
Total Units for Upper Division Program...82

Computer Science and Engineering

(As approved by the Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 186.

Subject Areas and Courses

Circuits, systems and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112...16
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 130A, 130B, 140A...9
Electrical Engineering breadth requirements—select nine units from Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112...16
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 130A, 130B, 140A...9
Electrical Engineering breadth requirement—select nine units from Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112...16
Materials science—Materials Science Engineering 132, 132L, 134L, 138, 138L, and two courses from Materials Science Engineering 140, 142, 144...18
Thermodynamics—Materials Science Engineering 130, Engineering 105A...6
Engineering science—Engineering 102A, 104A...6
Laboratory elective—Materials Science Engineering 149, Electrical and Computer Science Engineering 140A and other Electrical and Computer Science Engineering 140B or Materials Science Engineering 140L, 142L, and 144L...
Solid State Physics—Physics 115B or Materials Science Engineering 140A-140B, or Electrical and Computer Science Engineering 145A-145B or Electrical and Computer Science Engineering 148 and 149A...6
Probability Theory—Statistics 120, 131A or Mathematics 131...4
Humanities-Social Sciences electives and/or General Education electives...12
Total Units for Upper Division Program...98

Materials Science and Engineering

Materials Science and Engineering is directed towards an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology.

Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials.

The services of materials engineers are required in many different engineering operations; they study subjects ranging from fracture behavior in automobile tires to fatigue behavior in aircraft frames, from corrosion behavior in petro-chemical refineries to radiation dose damage in human beings. From the fabric to the design of semiconductors, materials engineers are also increasingly involved in developing the new materials needed to achieve higher efficiencies and to build our existing and proposed energy conversion schemes.

The undergraduate program in materials science and engineering provides the background for activities in research, processing, and the design of materials.

The curriculum is based on a common core of courses basic to engineering. These courses, taken during your first two years, provide a strong foundation in fundamental engineering concepts. In your third year, you will take a set of "fundamentals" courses (Materials Science Engineering 130, 132, 134, 138). With this background in hand, you are then ready for the "applications" courses (Materials Science Engineering 140, 142, 144, 147, 149) which are recommended for the fourth year.

Technical electives, selected from other engineering, or physical and natural science disciplines, give some 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 objective. These objectives may include research, 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 technical elective courses and the suggested areas of specialization are guide lines to assist you in selecting your area of specialization. You may elect to take courses from a number of these areas of specialization, or you may wish to concentrate on one or two areas.

Suggested technical electives:
Aerospace Structures:
Aeronautical Science and Engineering 130, 135, 137
Civil Engineering 131B
Automatic Control and Systems Analysis:
Mechanical Engineering 171, 172, 185, 187, 188
Electrical and Computer Science Engineering 148 and 149A
Biomedical Engineering:
Chemistry 107A, 107B

NOTE: For key to footnote symbols, see page 133.
Mechanical Engineering

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems requiring the application of physical and mechanical principles in the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Preparation for a broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, properties of materials, and economics.

The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first two years. Your third year is spent in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor’s level.

You are encouraged to select elective courses from among the areas of specialization listed below.

**AREAS OF SPECIALIZATION:**

*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 many social problems as environmental pollution, lack of mass transportation, and shortages of raw materials will depend heavily on the engineer's ability to create new machines and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of the design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:
- Aeronautical Science and Engineering 137
- Agricultural Engineering 119, 165
- Applied Engineering 115
- Chemical Engineering 150A, 150B, 150C
- Computer Science 130A, 130B, 130C
- Electrical and Computer Engineering 130
- Industrial Engineering 130
- Mechatronics 130
- Materials Science and Engineering 130
- Mechanical and Aerospace Engineering 130
- Mechanical Engineering 130
- Nuclear Engineering 130
- Petroleum Engineering 130
- Power Engineering 130
- Systems Engineering 130

*Energy Systems.* This area is specifically designed for those who would like to work in the fields of power generation, propulsion for transportation, and energy conversion. It is in these fields that 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 fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators, solar energy systems, and others.

Suggested technical electives:
- Engineering 160
- Engineering 162, 166

Suggested advisories:

**Transportation Systems.** An important aspect of Mechanical Engineering is the planning, design, and operation of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion, and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:
- Aeronautical Science and Engineering 127, 128, 129
- Civil Engineering 131A, 131B
- Mechanical Engineering 122, 160
- Mechanical Engineering 134, 152, 162, 172, 184A, 184B, 187

Suggested advisers:
- A.A. Frank, M. Hubbard, D.C. Karnopp, D.L. Margolis

**Mechanical 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 100-140
- Applied mechanics—Engineering 102A, 103A
- Applied mechanics—Engineering 105A, 106
- Applied thermodynamics—Engineering 105A, 106, 130
- Engineering design elective—select from Aeronautical Science and Engineering 137, Civil Engineering 132A, 132B, 133, Mechanical Engineering 150A, 150B, 150C
- Materials in design—Materials Science Engineering 140
- Measurements and laboratory—Materials Science Engineering 123L, 124L, 134L, 140L, 142L, 144L; Mechanical Engineering 176
- Materials science—Materials Science Engineering 132, 134, 138, 142, 144, 147
- Applied mathematics—Engineering 180
- Basic science—Chemistry 110A and 110C or 140
- Technical electives (Engineering 104B recommended)
- 15

**Total Units for Upper Division Programs**

**208 Engineering**

**Systems Dynamics and Control.** Engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control is concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to control the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.

Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical actuator 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, brakes, and steering systems as well as complete test vehicles. As plans for on-campus laboratories and a test track proceed, ten experimental vehicles are housed in a rented faculty facility and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:
- Aeronautical Science and Engineering 128, 131, 134, 152, 172, 184A, 184B
- Civil Engineering 134, 152, 172, 184A, 184B
- Mechanical Engineering 122, 160
- Mechanical Engineering 134, 152, 162, 172, 184A, 184B, 187

Suggested advisers:

**Transportation Systems.** An important aspect of Mechanical Engineering is the planning, design, and operation of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion, and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:
- Aeronautical Science and Engineering 127, 128, 129
- Civil Engineering 131A, 131B
- Mechanical Engineering 122, 160
- Mechanical Engineering 134, 152, 162, 172, 184A, 184B, 187

Suggested advisers:
- A.A. Frank, M. Hubbard, D.C. Karnopp, D.L. Margolis
Engineering 209

Mechanical Engineering/Materials Science and Engineering
Minimum units required for major: 192.0

Subject Areas and Courses

Electronic circuits—Engineering 100..............4
Applied mechanics—Engineering 102A, 102B, 104A, 104B.............12
Applied thermodynamics—Engineering 105A, 105B; Materials Science and Engineering 130; Mechanical Engineering 166.............13
Fluid mechanics—Engineering 103A, 103B..................6
Mechanical engineering design—Mechanical Engineering 150A, 150B, 150L, or 172, and one course from 184A-184B, 185, 186, 187, 188, or 189..................13
Controls and systems analysis—Mechanical Engineering 171..................4
Measurements and laboratory—Engineering 107, 109L, 109L, Mechanical Engineering 176..............................................6
Applied mathematics—Engineering 180..................3
Professional responsibilities—Engineering 190..........................2
Technical electives..................5

In order to satisfy design requirements, select two courses from Aeronautical Science and Engineering 129, 130; Materials Science Engineering 140, 149; Mechanical Engineering 150B, 172, 184A-184B, 185, 186, 187, 188, and (courses not used for design units above) 134, 151, 152, 162.

Total Units for Upper Division Program.............102

Courses in Engineering

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 illustrative of the solution of representative, but greatly simplified, engineering problems. (P/NP grading only.)

4. Engineering Graphics in Design (3) I, II. Henderson
Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry and of mechanical and freehand drawing; their application in the representation, visualization, and solution of engineering problems. Computer-aided graphics. Introduction to engineering design. (CAN Eng 2)

5. Applications of Computers (3) I, II, III.
The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Not intended for Electrical Engineering or Computer Science and Engineering majors. Digital computation and computer programming in FORTRAN. Algorithms and their description. Basic programming: editing, debugging, use of programs, approximate computing-accuracy and significance; solving simple numerical and nonnumerical problems. Students who complete this course or the equivalent and transfer into an Electrical Engineering or Computer Science and Engineering major, should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Engineering Computer Science 30-40 sequence. (CAN Csci 4)

17. Circuits (3) I, II. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. Basic electric circuit analysis techniques, including electrical quantities and their units, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. (CAN Engr 6)

20. The Technological World (3) II. Kemper
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 credit: Nature and Environment/Introduction.

35. Statics (3) I, II, II. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22C (may be taken concurrently); Physics 9A. Force systems and equilibrium: conditions with emphasis on engineering problems. (CAN Engr 8)

The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore status. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. (CAN Engr 4)

Upper Division Courses

100. Electronic Circuits and Systems (4) I, II, III.
The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 17. Introduction to theory and application of analog and digital circuits and systems. It is strongly recommended that students enroll in this course as soon as possible as it provides the foundation for Engineering 17.

102A. Dynamics (3) I, II, III.
The Staff (Henderson in charge)
Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C. Kinematics and dynamics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

102B. Dynamics (3) I, II, III.
The Staff (Henderson in charge)
Lecture—3 hours. Prerequisite: course 102A; 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 (Beadle in charge)
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, III.
The Staff (Brand in charge)
Lecture—3 hours. Prerequisite: course 102A (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) III. Chat- toli, Hafez
Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; one-dimensional compressible flow; fluid measurements; applications.

103L. Fluid Mechanics Laboratory (1) I, III.
Lecture—1 hour, discussion—1 hour, and laboratory—1 1/2 hours. (alternate weeks with course 103L). Prerequisite: course 103B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of state, the first and second laws of thermodynamics, and thermodynamic cycles. (P/NP grading only.)

105L. Thermodynamics Laboratory (1) I, II, III. Baughn
Lecture—1 hour, discussion—1 hour, and laboratory—1 1/2 hours (alternate weeks with course 105L). Prerequisite: course 102B (may be taken concurrently). Thermodynamic cycle and power processes; cycle analysis.

106. Engineering Economics (3) I, III. Hartsough
Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, and inflation and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

111. Electric Power Equipment (3) I, III.
Lecture—2 hours, laboratory—2 hours. Prerequisite: course 17. Principles of AC and DC electric motors and solenoids, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics.

122. Introduction to Mechanical Vibrations (3) I. Beadle
Lecture—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; response of coupled systems; electromechanical analogs; use of energy conservation principles.

160. Environmental Physics and Society (3) I.
Lecture—3 hours. Prerequisite: Physics 90, 9C, or 10 or 1B and Mathematics 16B or the equivalent.

NOTE: For key to footnote symbols, see page 133.
Engineering: Agricultural

Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Physics 106.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

102. Advanced Energy Technology (4) J. 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 policy order. Designed to mesh with course 100, which is primarily policy. (P/NP grading only.) Offered in odd-numbered years.

180. Engineering Analysis (3) III. Helfaz, Brandt Lecture—3 hours. Prerequisite: Mathematics 22B. Analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

190. Professional Responsibilities of Engineers (3) III. The Staff Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; professional practice and management; introduction to contracts, specifications, and business law; technical writing; oral presentations on the interactions between engineering and society.

Graduate Courses

254. Manufacturing Engineering (3) II. Dorr Lecture—3 hours. Prerequisite: course 100, Statistics 120, and Electrical and Computer Science Engineering 157A or Mechanical Engineering 172. Manufacturing and process engineering, productivity, planning, production and operations, inventory and facilities, quality, robots and flexible manufacturing systems.

291. Seminar in Teaching (1-3) Baugh Seminar—1 hour. Discussion of previous experience and study and actual practice as a teacher. (5U grading only.)

Engineering: Agricultural

(College of Engineering)

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Roger E. Garnett, Ph.D., Professor
D. Ken Giles, Ph.D., Professor
John R. Goss, M.S., Professor Emeritus
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R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Assistant Professor
Henry E. Studer, M.S., Professor
Shrinivas K. Upadhya, Ph.D., Associate Professor
Wesley W. Watterfield, Ph.D., Associate Professor
Wesley E. Yates, M.S., Professor Emeritus

Courses in Engineering: Agricultural

Lower Division Courses

1. Introduction to Agricultural Engineering (1-2) The Staff Lecture—1 hour. Introduction to the types of problems addressed by agricultural engineers. Selected problems in field machinery design and management, irrigation, agricultural structures, properties of agricultural materials, and waste management. Review of employment opportunities.

2. Introduction to Forest Engineering (1-3) Hartsoough Discussion—laboratory—3 hours. Introduction to the engineering aspects of logging, nursery operations, reforestation, harvesting, logging, transport, milling and residue utilization. (P/NP grading only.)

92. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Lecture in charge) Work-learning experience. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

96. Directed Group Study (1-5) I, II, III. The Staff (Lecture in charge) Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Lecture in charge) (P/NP grading only.)

Upper Division Courses

112. Combustion Engines (4) J. Jenkins Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5 and 105A. Theory of design and operating characteristics of internal and external combustion engines. Thermodynamics of relevant power cycles, performance characteristics, engine mechanics, fuel metering systems, ignition systems for both spark-ignited and compression-ignited engines. Design for engine applications. Comparison of alternative fuels and engines.

114. Principles of Field Machinery Design (3) J. Studer Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 112A. Functional requirements and basic operating principles of field machines; elements of field machinery design; use of instrumentation and computer techniques for analysis of specific machines.

115. Forest Engineering (3) III. Hartsoough Lecture—3 hours. Prerequisite: Civil Engineering 10, Engineering 102A and 104A; Forestry and Resource Management 100A, 100B, 100C, 100D (Berkeley campus). Study of engineering principles to problems in the forest industry, including consideration of nursery operations, reforestation, harvesting, road layout, log transport and milling.

116. Forest Engineering Field Problems (2) M. Liles Lecture—1 hour; three weekend field trips to Bidwell Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

117. Stability and Traction of Off-Road Vehicles (2) J. Chen Lecture—2 hours. Prerequisite: Engineering 102A and 104A. Drive train elements, suspensions, tires, tracks, chassis configuration and steering system mechanics for heavy-duty vehicles. Performance, stability, and traction during pulling, turning, and transportation. Vehicle interactions with off-road terrain conditions.

119. Hydraulic Systems (3) III. Chen Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Principles of operation, characteristics, testing and selection of hydraulic system components: pumps, motors, cylinders, control elements, and accessories. Design and analysis of hydraulic systems.

125. Agricultural Structures: Environmental Aspects (3) J. Jenkins Lecture—3 hours. Prerequisite: Engineering 105A. Fundamentals of heat transfer, solar radiation, psychometrics, ventilation, animal energetics, lighting with respect to plant growth, atmospheric properties with respect to storage of agricultural products. Application of this information to the design of animal and plant production and product storage structures.

132. Unit Operations in Food Engineering (4) III. Singh, T. Rumsey Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

145. Irrigation and Drainage Systems (4) II. Wallender, Grismer, Hills Lecture—4 hours. Prerequisite: Engineering 103A or Water Science 142. Engineering and scientific principles applied to the design of surface, sprinkler and micro irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Water Science 145.)

165. Digital Instrumentation in Agricultural Engineering (4) I. Delwiche Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Digital logic concepts and devices; assembly language programming; data acquisition and control.

170A. Engineering Projects: The Design and Evaluation Process (2) M. Miles Lecture—1 hour; laboratory—3 hours. Prerequisite: two courses from the following (one may be taken concurrently) — courses 10, 105, and 106. Civil Engineering 145, Mechanical Engineering 150A, Water Science 160. Principles and procedures for project design and evaluation, with emphasis on agricultural and forestry projects. Project selection, data sources, agricultural and forestry factors, specifications, failure modes, human factors, safety, test design, measurement techniques. Develop proposals for course 170B.

170B. Engineering Projects: Design (3) I. Miles Laboratory-discussion—three 2-hour sessions. 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.

179C. Engineering Projects: Design Evaluation (3) III. Miles Laboratory—three 3-hour sessions. 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.

192. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Lecture in charge) Work-learning experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 133.
198. Directed Group Study (1-5) II, III. The Staff (Studer in charge)
Prearranged consent of instructor. (PINP grading only)

199. Special Study for Advanced Undergraduates (1-5), II, III. The Staff (Studer in charge)
Prearranged consent of instructor. (PINP grading only)

Graduate Courses

215. Soil-Machine Relations in Tillage and Trac-
tion (3) I. Chancelor
Lecture—3 hours. Prerequisite: course 114 or 117.
Mechanics of interactions between agricultural soils and tillage and traction devices; determination of rel-
evant physical properties of soil; analysis of stress and strain of various soil-machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

216. Energy Systems in Agriculture (3) III. Jenkins
Lecture—3 hours. Prerequisite: Engineering 105A.
Theory and application of energy systems in agricul-
ture. Analysis of energy transformation processes and optimal systems design utilizing stock and flow energy resources. Offered in even-numbered years.

220. Pilot Plant Operations in Aquacultural Engi-
neering (3) III. Piedrahita
Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Agricultural Engi-
neering Technology 161A-161B. Topics in water treatment as they apply to aquaculture operations. Laboratory study of units operations in aquaculture. Offered in even-numbered years.

225. Advanced Unit Operations in Process and Food Engineering (3) II. T. Rumsay
Lecture—3 hours. Prerequisite: an upper division course in process or food engineering. Basic pro-
cedures applicable to process and food engineering; Heat and mass transfer applications to drying, dehid-
eration and freezing; flow of food and semi-fluid materials; size reduction; respiration of bio-materials.

240. Infiltration and Drainage (3) I. Grismer
Lecture—3 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 entrainment during infiltration, and transient drainage with nonlinearity, capillarity, and evapotranspiration considered. Offered in odd-numbered years. (Same course as Water Science 240.)

241. Sprinkle and Trickle Irrigation Systems (3) III. Hill
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145 (may be taken concurrently). Compu-
terized design of sprinkle and trickle irrigation systems. Techniques for field evaluation of pressurized irri-
tation systems. Incorporation of water treatment, chemigation, and automation in these systems.

242. Hydraulics of Surface Irrigation (3) III. Wal-
tendorf
Lecture—3 hours. Prerequisite: a course in differen-
tial and integral calculus; a course in hydraulics or fluid mechanics including some open-channel flow; a course in irrigation principles. Mathematical mod-
els 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 a field length as a function of slope, roughness, infiltration and inflow rates.

245. Agricultural Wastes Management (3) III. Hillis
Lecture—3 hours. Animal, crop and food processing wastes; pesticides, fertilizers, odors, dust and smoke in air pollution to environmental pollution. Disposal needs, present and future. Regulation, economics and public concern; coordination with municipal and industrial wastes management. Offered in even-numbered years.

250. Design of Mechanical Systems (2)
Lecture—2 hours. Prerequisite: mechanical design and economics recommended. Experience with design; evaluating design concepts and establishing design criteria; analysis and synthesis in design; optimization techniques; human factors in design.

250. Analog Instrumentation (4) II. Delwiche
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrument characteristics: general-

265. Design and Analysis of Engineering Experi-
ments (4) II. Upadhyaya
Lecture—4 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 statisti-
cal methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

270. Modeling and Analysis of Biological and Phys-
ical Systems (3) III. Upadhyaya, T. Rumsay
Lecture—3 hours. Prerequisite: Civil Engineering 212A. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within Agricultural Engineering. Offered in odd-numbered years.

275. Physical Properties of Agricultural Materials (3) I. Chen
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, particularly mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of agricultural materials.

289A-D. Selected Topics in Agricultural Engineer-
ing (1-5), II, III. The Staff (Studer in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of select-
ed topics with separate sections: (A) Simulation of Food Processing Systems; (B) Thermal Process Design; (C) Fermentation Engineering; (D) Alternate Energy Systems.

290. Research Methods in Agricultural Engineer-
ing (2) I. Giles
Lecture—1 hour; discussion-laboratory—1 hour. Prerequisite: graduate student standing or consent of instructor. Planning, execution, and reporting of research projects. Literature review techniques and proposal preparation. Identification of sources for support of research. Oral presentation of research results. Written presentation of research results, manuscript preparation, submission, and review.

290C. Graduate Research Conference (1), II, III.
The Staff (Studer in charge)
Discussion—1 hour. Prerequisite: consent of instruc-
tor. Research problems, progress and techniques in agricultural 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.)

297T. Supervised Teaching in Agricultural En-
gineering (1-3), II, III. Singh
Laboratory—3 hours; tutorial—3-9 hours. Prerequisite: graduate standing; consent of instructor. Tut-
oring and teaching students in undergraduate courses offered in the Department of Agricultural Engineer-
ing. Weekly conferences with instructor, evaluation of teaching. Preparing for and conducting demonstra-
tions, laboratories, and discussions. Preparing for grading exams. May be repeated for a total of 6 units. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Studer in charge)

299. Research (1-12) I, II, III. The Staff (Studer in charge)
(SU grading only)

NOTE: For key to footnote symbols, see page 133.

Engineering: Applied Science 211

Engineering: Applied Science
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John S. De Groot, Ph.D., Professor
Farid Dowla, Ph.D., Lecturer
Paul Drake, Ph.D., Professor
Michael Felt, Ph.D., Lecturer
Jeff Feo, Ph.D., Lecturer
Patrick Pitch, Ph.D., Lecturer
John G. Fitcher, Ph.D., Lecturer
Roger A. Haas, Ph.D., Professor
William G. Hoover, Ph.D., Professor
David Q. Hwang, Ph.D., Associate Professor
John Illiessen, Ph.D., Professor
William L. Kruer, Ph.D., Lecturer
Nelson Max, Ph.D., Professor
Andrew McMahan, Ph.D., Lecturer
Arthur A. Mirm, Ph.D., Lecturer
William A. Newcomb, Ph.D., Adjunct Professor
Ann Noll, Ph.D., Assistant Professor
Richard F. Post, Ph.D., Professor Emeritus
Harry S. Radousky, Ph.D., Lecturer
Garry Rodrigue, Ph.D., Professor
Bruce Shore, Ph.D., Lecturer
E. Eugene Schulz, Ph.D., Lecturer
Stephen K. Skrticzelski, Ph.D., Lecturer
Wilson K. Talley, Ph.D., Professor
Edward Teller, Ph.D., University Professor Emeritus
Richard Van Kornynburg, Ph.D., Lecturer
Rao Vemuri, Ph.D., Professor
Richard W. Watson, Ph.D., Lecturer
Frederick Wooten, Ph.D., Professor
Yin Yeh, Ph.D., Professor

Courses in Engineering:

Applied Science

Davis

Lower Division Courses

98. Directed Group Study (1-5) I, II, III. The Staff
(Wooten in charge)
Prearranged consent of instructor and lower division standing. (PINP grading only)

99. Special Study for Undergraduates (1-5) I, II, III.
The Staff (Wooten in charge)
Prearranged consent of instructor; lower division standing. (PINP grading only)

Upper Division Courses

115. Introduction to Numerical Methods for Engi-
neers and Scientists (3) I, II, III. The Staff (Wooten in charge)
Lecture—3 hours. Prerequisite: Engineering 5; Math-
ematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenvalue problems, systems of linear algebraic equations, ordinary differen-
tial equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

116. Computer Solution of Physical Problems (3)
II, III. De Groot
Lecture—3 hours. Prerequisite: course 115 or con-
sent of instructor. Application of computers to sou-
}
135. Introductory Nuclear Science and Technology (3) I. The Staff Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductory aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes. Interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurement; neutron technology; nuclear chemistry.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungerman (Physics), Craig (Mechanical Engineering) Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 18, 58, 90, or 110. Scientific and technical aspects of nuclear arms effects and nuclear arms control including: the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (Same course as Physics 137.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

147. Arms Race Technologies and Strategies (3) I. Craig Lecture—2 hours, discussion—1 hour. Prerequisite: course 137/Physics 137. Technological and strategic issues of the arms race. Characteristics of nuclear weapons and weapons defense systems; responses and counter-responses. Advantages and disadvantages of alternative realizations of weapons systems.


165B. Quantum Optics II (3) II. I. I. 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. I. Yeh Laboratory—3 hours. Prerequisite: course 165A concurrently. On hand experience in working with lasers, photon spectroscopy, electro-optical devices and photoelectric counting statistics.

166B. Quantum Optics Laboratory (1) II. I. I. Yeh Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 165A.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. De Groot Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.


189. Group Study (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

228A-228B-228C. Properties of Matter (3-3-3) I-II-III Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic description of matter: thermodynamics and kinetics; constitutive equations; fluid, mechanical and thermal properties.

230A-230B-230C. Structure of Matter (3-3-3) I-II-III Lecture—3 hours. Prerequisite: course 265C. Classical properties of matter; introduction of quantum mechanics by the nonrelativistic principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.


280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. De Groot Lecture—3 hours. Prerequisite: course 234B or current student 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; fluid equations; correlation functions; linear and magnetic confinement systems in controlled fusion.


288A-L. 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 Electronics; (J) Solid State. May be repeated up to a total of 15 units charge.

290. Seminar (1-2) I, II, III. The Staff (Wooten in charge) Seminar—1-2 hours. (SU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Wooten 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 (Wooten in charge) (SU grading only.)

299 Research (1-12) I, II, III. The Staff (Wooten in charge) (SU grading only.)

Livermore

Upper Division Courses

101. Data Structures (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Introduction to algorithms and data structures and algorithms that are useful in all programming courses. Topics include programming language Pascal, lists, queues, trees, graphs, sorting and searching algorithms, and memory management algorithms.

103. Introduction to Computer Architecture (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Basic hardware knowledge for computer science students. Many computer architecture courses stress hardware and how they function. Covers topics like number systems, symbolic logic, assembly language, and logic implementation. Several assembly language programs are required.

106. Language Structures (3) I. II. The Staff Lecture—3 hours. Prerequisite: course 101 or the equivalent. Fundamental structure of a programming language, and an introduction to language processing. Topics include types, objects, operations, block structure, parameter passing, pointers and loaders, and lexical analysis.

108. Concurrent Programming (3) III. I. The Staff Lecture—3 hours. Prerequisite: course 103 or 106 or the equivalent. Presentation of concepts surrounding concurrent and/or parallel programming. Some application to operating systems. Focus on concepts of processes and synchronization, emphasizing their use in solving classical problems. This material is then related to operating system design.

111. Introduction to Foundations of Computing (3) II. Blattner Lecture—3 hours. Prerequisite: course 101; Computer Science Engineering 90. Basic ideas in the theory of computing and the analysis of algorithms. Topics included: finite automata, regular and context-free grammars, order of execution time and space, advanced programming techniques.

113. Computer Graphics (3) II. Max Lecture—3 hours. Prerequisite: Mathematics 21C, 22A, Computer Science Engineering 40. Development of the algorithms for producing perspective line drawings of three-dimensional objects as defined by polygons or by bicubic surface patches.

115. Introduction to Numerical Methods for Engineers and Scientists (3) I, III. III. The Staff (Wooten in charge) Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

116. Introductory Nuclear Science and Technology (3) I. The Staff Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductory aspects of nuclear phenomena, nuclear masses, nuclear decay, decay modes. Interactions of particles and electromagnetic radiation with matter. Instrumentation and theory of measurement; neutron technology. Nuclear chemistry.

186. Group Study (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

201A. Software Engineering (3) I. Blattner Lecture—3 hours. Prerequisite: courses 101 and 106. Development of large, production-quality programs, project management techniques, software design methodologies, computer security, and the legal aspects of software development.

201B. Software Engineering (3) III. Blattner Lecture—3 hours. Prerequisite: course 201A. Automated and integrated software tools for programming environments. Small-talk environment will be studied in depth. Tools implemented by object-oriented software will be examined.

202. Data Base Management (3) II. The Staff Lecture—3 hours. Prerequisite: courses 101 and 103. Discussion of database models and their implementations. Course roughly divided into thirds: physical organization, logical organization, and distributed systems.

203A. Computer Architecture (3) I. Verma 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.

NOTE: For key to footnote symbols, see page 133.
203B. Computer Architecture (3) I. Vernuri Lecture—3 hours; research paper and programming project, 208A. 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, 121, 204B, and consent of instructor. Artificial intelligence. Goal reduction, exploiting constraints, control mechanisms, and storing common sense knowledge are introduced. LISP programming language is used. Offered in even-numbered 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-deducitive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in odd-numbered years.

204C. Rule-Based Expert Systems (3) III. The Staff Lecture—3 hours. Prerequisite: course 204A. Construction of rule-based interpreters. Includes knowledge representation, resolution of belief, data inference, control strategies, and the practical use of rule-based expert systems. Offered in odd-numbered years.

205A. Mathematical Methods (3) I. Kileen Lecture—3 hours. Prerequisite: course 120 or the equivalent. Differential equations in the complex plane; contour integration; conformal mapping; Fourier and Laplace transforms; calculus of variations; applications of these techniques to physical systems.

205B. Mathematical Methods (3) II. Kileen Lecture—3 hours. Prerequisite: course 205A or the equivalent. Eigenvalue problems; solution of linear differential and integral equations by expansions in orthogonal functions; Green's functions; approximation methods; applications to physical systems.

206. Programming Languages (3) III. The Staff Lecture—3 hours; programming project. Prerequisite: course 106 or the equivalent. Examines topics in modern programming languages, programming model and binding times, abstract data types, functional languages, and syntax analysis.

207. Compiler Construction (3) I. The Staff Lecture—3 hours. Prerequisite: course 206. Syntax-directed tools 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, 208B. Design of an operating system. Emphasis given to mechanisms commonly used to implement systems and to operating system 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.

208C. Operating Systems III (3) III. The Staff Lecture—3 hours. Prerequisite: course 208B. Synchrophonic principles of modularity of interprocess communication: the abstract object model; distributed access control; recovery, synchronization; naming; atomic actions; client/server model; implementation of a distributed kernel; example distribution applications.


210A-210B. Advanced Methods of Computational Physics (2-3) III-III. Kileen Lecture—3 hours. Prerequisite: course 209 or Mathematics 229A-229B or the equivalent. Computational methods in various fields including: hydrodynamics, plasma physics, magnetohydrodynamics, and Fokker-Planck equations, particle codes, neutron and radiation transport, chemical kinetics, and atmospheric modeling.

211. Automata Theory and Formal Languages (3) I. The Staff Lecture—3 hours. Prerequisite: course 111. Relation between type 0 (through type 2) languages and their respective machines (turing machine, linear bounded automata, and push down automata) is discussed. decidability and the Halting problem discussed.

212. 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, and matrix manipulation using asymptotic notations. NP completeness and intractability also discussed.


214. Computing with Symbolic Expressions (3) III. The Staff Lecture—3 hours. Prerequisite: courses 211 and 212. Theory and practice of computing with symbolic expressions. The LISP and SNOBOL programming languages. Writing programs to manipulate symbolic expressions. Algebraic manipulation. Proving the equivalence of algorithms. Survey of symbolic manipulation languages. Offered in even-numbered years.

215A. Computational Mathematics (3) III. Rodriguez Lecture—3 hours. Prerequisite: course 115 or the equivalent. First course of a two-course sequence that focuses on computational methods for solving numerical problems. Emphasis is on solutions applicable to computers. Topics covered: linear systems, non-linear equations, and interpolation.

215B. Computational Mathematics (3) III. Rodriguez Lecture—3 hours. Prerequisite: course 215A. Second course of a two-course sequence that focuses on computational methods for solving numerical problems. Emphasis is on solutions applicable to computers. Topics covered: optimization, integration, differentiation, and ordinary differential equations.

218A-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) I, II. The Staff Lecture—3 hours. Prerequisite: courses 205A and 205B (may be taken concurrently). Designed for physical scientists. Topics in computer science with applications to computational science. Computer organization and architecture, data structures, algorithms and complexity, software environments for scientific visualization, symbolic computation.

218A. Signal Processing (3) I. The Staff Lecture—3 hours. Prerequisite: course 115A, 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 odd-numbered years.

218B. Signal Processing (3) III. The Staff Lecture—3 hours. Prerequisite: course 218A. Systems and signals, convolution, causality, and stability. Z-transform, DFT, DFT IIR, and FIR filters. Adaptive filters, array signal processing, spectral estimation, and image processing. Offered in even-numbered years.

220. Artificial Neural Networks (3) I. Vernuri Lecture—3 hours. Prerequisite: Mathematics 167. Introduction to artificial neural networks. Content includes supervised learning, unsupervised learning, and back propagation algorithms. Comparisons of standard models including perceptrons, multilayered and Hopfield nets. Supervised and unsupervised learning. Offered in even-numbered years.

222. User Interfaces (3) II. The Staff Lecture—3 hours. Prerequisite: courses 101, 106. Design and evaluation of the interface between systems and users. Covers user interaction styles and techniques, display formats, user guidance, and methodologies for designing and evaluating user interfaces. Offered in odd-numbered years.

224. Microprogramming and Microprogrammable Architecture (3) III. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Concepts of microprogramming, design and implementation of the internal control of complex hardware primitives. Survey of the architecture of commercially available, user microprogrammable computers. Course includes a programming project on a department computer.

227. Chaos, Fractals, and Nonlinear Dynamics (3) III. Hoover Lecture—3 hours. Prerequisite: course 115. Comptuational treatment of the mathematics of pervasive instabilities sensitive dependence on initial conditions called chaos. Second Law of Thermodynamics to nonlinear dynamics. Strange attractors which result are generally fractal objects with great aesthetic and intellectual appeal.

228A-228B. Properties of Matter (3-3) I-II. Hoover Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter: thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

229. Materials Science (3) II. Hoover Lecture—3 hours. Prerequisite: course 205C. Facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase transformations, etc. Covers thermodynamics of point defects, diffusion, elasticity, dislocation theory.

230A-230B. Structure of Matter (3-3) I-II. The Staff Lecture—3 hours. Prerequisite: course 205C. 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.

231A-231B. Theory of Solid-State Physics (3-3) I-II. 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.

238A-238B. Nuclear Physics (3-3) I-II. The Staff Lecture—3 hours. Prerequisite: course 230C. Basic properties of nuclei; radioactive decay; nuclear models; low energy nuclear reactions; neutron physics. Interaction of particles and radiation with matter.

236. Theory of Particle Reactions (3) I. The Staff Lecture—3 hours. Prerequisite: courses 125, 226C, 234B. General theory of atomic and nuclear reactions; cross-sections for the collision of electrons, photons, and nuclear particles with atoms and/or nuclei. Properties of particles by emission of unstable atoms or nuclei.

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.

236. Continuum Mechanics (3) III. Christensen Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability, viscous hydrodynamics; boundary layer theory.

257. Magneto-hydrodynamics (3) III. Newcomb Lecture—3 hours. Prerequisite: course 246B. Fundamentals of magnetohydrodynamics, 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-II-III. Oel Lecture—3 hours. Prerequisite: course 240A-240B-240C or the equivalent. Atomic structure and spectra, molecular structure and spectra, classical and quantum mechanical collision theory of electron and heavy particule scattering.


277. Nonlinear Optics Laboratory (3) III. Cameron Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-266B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric oscillation and amplification, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation. Laser spectroscopy.

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. Being Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fully plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov Theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.


288A-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 Electronics; (J) Solid State. May be repeated up to a total of 5 units per segment.

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 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 (SU grading only)

299. Research (1-12) I, II, III. The Staff (Wochen in charge) (SU grading only)

Engineering: Chemical

(288A-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 Electronics; (J) Solid State. May be repeated up to a total of 5 units per segment.

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 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 (SU grading only)

299. Research (1-12) I, II, III. The Staff (Wochen in charge) (SU grading only)

Engineering: Chemical

(Course of Engineering) Brian G. Higgins, Ph.D., Chairperson of the Department Office Department, 3092 Bainter Hall (916-752-0400)

Faculty Richard L. Bell, Ph.D., Professor Roger B. Boulton, Ph.D., Associate Professor (Chemical Engineering, Viticulture and Enology) Brian G. Higgins, Ph.D., Associate Professor Alan F. Jackman, Ph.D., Professor David P. Katz, Ph.D., Professor (Chemical Engineering, Osteotics and Gynecology) Benjamin J. McCoy, Ph.D., Professor Karen A. McDonald, Ph.D., Assistant Professor Ammet N. Palazoglu, Ph.D., Assistant Professor Robert L. Powell, Ph.D., Associate Professor Dewey D. Ryu, Ph.D., Professor (Chemical Engineering, Viticulture and Enology) J. M. Smith, Sc.D., Professor Emeritus Peter Strueve, Sc.D., Professor Stephen Whitaker, Ph.D., Professor

Courses in Engineering: Chemical

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. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and lower division standing. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses 150A. Chemical Engineering Fluid Mechanics (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 22C, Engineering 35. Fluid statics and one-dimensional laminar flows. Kinematic and exact 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. The Staff Lecture—3 hours. Prerequisite: Chemistry 110A and 128B (may be taken concurrently); a working knowledge of FORTRAN. Application of principles of conservation of mass for single and multi-component systems in chemical process calculations. Stresses of batch, semi-batch, and continuous processes involving mass transfer, change of phase, and chemical reaction.

153. Chemical Engineering Thermodynamics (9) 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.

152. 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.


154A. Mass Transfer (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (I) I. 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.

155. 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) I, II. The Staff Laboratory—12 hours. Prerequisite: courses 154B, 155A. Continuation of 155A.

156A. Chemical Engineering Thermodynamics (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 155B, 154A; and Chemistry 110C (may be taken concurrently). Chemicals and introduction to homogeneous and heterogeneous reactor design.

NOTE: For key to footnote symbols, see page 133.
Engineering: Civil
(College of Engineering)
Chi-Hang Shen, Ph.D., Chairperson of the Department (916-752-1753)
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Faculty
Kendrick K. Aunakandann, Ph.D., Professor
Takashi Aso, Ph.D., Adjunct Professor
Don O. Brush, Ph.D., Professor
Robert H. Burg, M.S., Professor Emeritus (Civil Engineering: Land, Air and Water Resources)
Daniel Y. Chang, Ph.D., Professor
James A. Cheney, Ph.D., Professor
Yannis F. Daftaris, Ph.D., Professor
Jeanne L. Darby, Ph.D., Assistant Professor
Johannes J. DeWitt, Ph.D., Adjunct Lecturer
Leonard R. Herrmann, Ph.D., Professor
James R. Hutchinson, Ph.D., Professor (Graduate Adviser)
I.M. Idrisi, Ph.D., Professor
William K. Johnson, M.S., Lecturer
Paul P. Jovais, Ph.D., Associate Professor
M. Levent Kayas, Ph.D., Professor
Ian P. King, Ph.D., Lecturer
Ryutichi Kitamura, Ph.D., Professor
Ray B. Kranz, Ph.D., Professor Emeritus
Bruce L. Kutter, Ph.D., Associate Professor
Bruce E. Lawrence, Ph.D., Assistant Professor
Jay R. Lund, Ph.D., Assistant Professor
Miguel A. Manoh, Ph.D., Professor (Civil Engineering: Land, Air and Water Resources)
Kyril D. Mires, Ph.D., Assistant Professor
Patricia L. Mokhtari, Ph.D., Assistant Professor
Gerald T. Orloci, Ph.D., Professor
Carlos F. Puente, Ph.D., Visiting Assistant Professor (Civil Engineering: Land, Air and Water Resources)
Otto G. Raabe, Ph.D., Professor in Residence (Civil Engineering: Laboratory for Energy-Related Health Research)
Melvin R. Ramey, Ph.D., Professor
Karl M. Romstad, Ph.D., Professor
Edward J. Schroeder, Ph.D., Professor
Verne H. Scott, Ph.D., Professor Emeritus (Civil Engineering: Land, Air and Water Resources)
Chi-Kang Shen, Ph.D., Professor
Drs. Spertila, Ph.D., Associate Professor (Civil Engineering: Environmental Studies)
Michael A. Taylor, Ph.D., Professor
George Tzabanagougos, Ph.D., Professor

Courses in Engineering: Civil

Lower Division Courses

1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge)

Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

10. Introduction to Surveying (3) III. The Staff

Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves, astronomical observations and calculations for latitude, longitude, azimuth, and time. (CENG Engr 10)

30. Engineering a Better Environment (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodology of environmental engineering. Topics presented include water and air quality, environmental radiation and radioactivity, wastes management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physical science majors. General Education credit: Nature and Environment (NRE-110).

92. Internship in Engineering (1-5) II, III. The Staff (Chairperson in charge)

Work—learn experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised experience in civil engineering may be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineers (3) I, II. Kitanura

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, III. Romstad

Prerequisite: Mathematics 22A; Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic structural analysis of determinate and indeterminate trusses, beams, and frames. Calculation of displacements, and stresses. Methods of virtual work, moment area, superposition, slope deflection, moment distribution.

131B. Matrix Structural Analysis and Introduction to Finite Element (3) III. Romstad

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) II. Ramsey

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. Kavas

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. Buckling code requirements for bending, shear, axial load, combined stresses and bond.

132C. Structural Design: Timber Elements (3) III. Ramsey

Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

133. Properties of Concrete (4) I. Taylor

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104B. 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. Taylor

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132A; 132B (may be taken concurrently). Dead and live loading, earthquake and wind forces. Analytical analyses of building frames; concrete building design. Plastic analysis of metal frames.

137. Construction Principles (3) II. 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; fundamentals principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

138. Earthquake Loads on Structures (3) I. Romstad

Lecture—3 hours. Prerequisite: course 131A; Engineering 102A. Determination of loads on structures due to base motions. Methods of static lateral forces, approximate dynamic analysis (response spectrum), and time history. Concepts of mass, damping, and stiffness for typical structures. Design for inelastic behavior. Consideration of wind and blast loading.

139. Prestressed Concrete (3) II. Taylor

Lecture—3 hours. Prerequisite: course 132B. Principles and methods, analysis and design of sections for bending, interactive computer analysis, ultimate strength of sections. Lots of prestress, shear design. Applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.

140. Environmental Analysis of Aqueous Systems (3) Darby

Lecture—3 hours. Prerequisite: Chemistry 1B; course 140L concurrently. Introduction to principles underlying current practices in sampling and analysis of water and wastewater.

140L. Environmental Analysis of Aqueous Systems Laboratory (1) I. Darby

Laboratory—3 hours. Prerequisite: course 140 concurrently. Introduction to laboratory practice in the examination of water and wastewater. "Wet chemical" and instrumental techniques.

141. Engineering Hydraulics (3) I, III. Larock

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects; boundary layers, lift and drag.

141L. Engineering Hydraulics Laboratory (1) I, III. Larock

Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.

142. Engineering Hydrology (3) I, II. Kavas

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently), or the equivalent. Open to Engineering students only. Statistical hydrologic methods. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Evapo-transpiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

142L. Engineering Hydrology Laboratory (1) I. Kavas

Laboratory—3 hours. Prerequisite: course 142 (may be taken concurrently). Laboratory calculations and demonstrations of hydrologic processes, such as rainfall-runoff, storm characteristics and precipitation, evaporation and transpiration, infiltration, streamflow, and flood routing.

143. Water Resources Engineering and Management (3) II. Scott

Lecture—3 hours. Prerequisite: course 142 recommended. Engineering and management concepts affecting the planning, development, design, and operation of multipurpose projects. Consideration of water sources, data, quality and uses; policies, legislation; institutions; laws, economics, environmental concerns; and public participation.

144. Groundwater Systems Design (3) I. Darby

Lecture—3 hours. Prerequisite: Engineering 5 and course 142 (may be concurrently). Applied Science Engineering 116 recommended. Groundwater occurrence, distribution, and movement; well-flow systems; design of wells; groundwater quality and contamination; aquifer management. Introduction to groundwater modeling.

NOTE: For key to footnote symbols, see page 133.
145. Hydraulic Structure Design (3) III. DeVries Lecture—2 hours; laboratory—3 hours. Prerequisite: course 141, 141L, 142 Principles of project design. Methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control projects. Emphasis is on application of principles of open channel hydraulics in these systems.

146. Water Resources Simulation (3) III. Lund Lecture—3 hours. Prerequisite: course 142. Simulation techniques in the design of water resources projects; introduction to simulation theory and modeling; development and application of simulation models to surface water and groundwater problems.

147. Solid Waste Management (3) III. Tchobanoglous Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment.


148B. Water Quality Management Systems Design (3) II. Tchobanoglous Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introductions to the design of water and wastewater treatment processes.

149. Introduction to Air Pollution (3) I. Carroll (Land, Air, and Water Resources), Chang, Reabe Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; Chemistry 1B; Atmospheric Science 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Atmospheric Science 149.)

152. Introduction to Civil Engineering Planning (3) I. The Staff Lecture—3 hours. Basic planning concepts; role of engineering, economic, environmental, and social information; institutional, political and legal aspects. Case studies will illustrate planning of water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.

153. Deterministic Optimization and Design (3) I. Lund Lecture—3 hours. Prerequisite: Mathematics 21C, 22C; Engineering 12A. Introduction to optimization. Techniques such as linear programming, dynamic programming, and non-linear programming. Applications in water resources planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.


161. Transportation System Operations (3) II. Jovanis Lecture—3 hours. Prerequisite: Engineering 102A. Principles of transportation system operations; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and network applications, application to urban streets, freeways, and mass transit services.


163. Energy and Environmental Aspects of Transportation (3) II. Sperling Lecture—3 hours. Prerequisite: course 160. Application of engineering, economic, and system planning concepts. Analysis of road, rail, and air transport, and other selected environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption in light of institutional, policy, and economic forces in even-numbered years. (Same course as Environmental Studies 163.)

171. Soil Mechanics (3) I, II. Arunaranandan Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Open to Engineering students only. Soil formations, mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, capillarity and permeability, compressibility and consolidation, stress—state of stress and failure criteria.

172. Soil Properties, Soil Behavior, and Engineering Applications (3) I. Sperling Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 10 and 171 (may be taken concurrently). Laboratory studies of physical, mechanical, and hydraulic properties of soils and the use of these properties to predict the soil behavior in engineering investigation of geotechnical problems.

173. Foundation Design (4) II. Shen Lecture—4 hours. Prerequisite: courses 126B and 171. Theory of foundation and its application to foundation design; methods of minimizing settlements and effect of settlement on structures; bearing capacity of soils; footing design; lateral earth pressures; retaining-wall design; pile and pile foundation.

177. Soil-Water Dynamics Laboratory (2) II. Chen Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171. Laboratory experiments in current research areas in soil dynamics, topics to vary from year to year. Examples: excavation by explosives, impact penetration in soft soils, simulated earthquakes in centrifuge models, seepage erosion in soil.

189A-J. Selected Topics in Civil Engineering (1-5) I, II, III, The Staff (Chairperson in charge) Prerequisite: consent of instructor. Directed group study of selected separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit when the topic is different.

192. Internship in Engineering (1-5) I, II, III, The Staff (Chairperson in charge) Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge) Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

201. Introduction to Theory of Elasticity (3) I. Hutchinson Lecture—3 hours. 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 principles and approximate methods.

202. Buckling of Columns and Plates (3) III. The Staff Lecture—3 hours. Prerequisite: courses 201 and 221. Analysis of the buckling behavior of structural members: buckling of columns, linear buckling of beams, nonlinear bending and lateral-torsional buckling of beam-columns, stability of structural frames. Buckling strength and ultimate strength of plates.

203. Inelastic Behavior of Solids: Plasticity (3) III. Daifalas Lecture—3 hours. Prerequisite: course 201. Fundamentals of plasticity, the concept of yield, strain-hardening, and the associated constitutive equations for plastic solids. Solution of selected practical problems involving elastic-plastic, strain-hardening materials. Slip line field theory and limit analysis. Offered in even-numbered years.

204. Viscous Behavior of Solids (3) III. Daifalas Lecture—3 hours. Prerequisite: course 201. Fundamentals of viscoelasticity and viscoplasticity for solids. Characterization of engineering materials, including rubber, plastic, concrete, metals, etc. General analysis procedures for problems in viscoelasticity. Offered in odd-numbered years.

205. Continuum Mechanics (3) I. Daifalas Lecture—3 hours. Prerequisite: course 203 or 204. Tensor formulation of the conservation equations of linear continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in odd-numbered 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) II. Mish Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 126A-128B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures; Galerkin and stationary principle methods. Construction of approximate solutions by the finite element method. Application of one- and two-dimensional finite elements in engineering. Introduction to time dependent, non-linear and three-dimensional problems, and other approximation procedures.

212C. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) III. Herrmann Lecture—2 hours; laboratory—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) III. Larock Lecture—2 hours. Prerequisite: courses 141, 212A; additional knowledge of fluid mechanics recommended. 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.

213. Analysis of Structures Subjected to Dynamic Loads (3) III. Rosstad Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake wind and blast loading: direct, 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 (3) I. Hermann Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Discussion of plate bending theory including orthotropic behavior; application to transversely loaded, circular, and rectangular plates. Equivalent orthotropic properties for composite plates. Analysis of plates and numerical methods for solution of plate equations.


223. Advanced Topics in Concrete Structures (3) I. Taylor Lecture—3 hours. Prerequisite: course 128B. Ductility of reinforced concrete; design for torsion of structural concrete; yield line theory for the design of concrete slabs; analysis and design of deep reinforced concrete beams.

224. Advanced Design of Steel and Concrete Structures (3) J. I. Ramsey Lecture—3 hours. Prerequisite: courses 132A, 132B, 106 (may be taken concurrently). Design considerations for columns and frame buckling; design for combined biaxial bending and axial loading of concrete compression members; steel—concrete composite design; steel-plated girder design.


228. Air Quality (3) I. J. Chang Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 149, or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.

232B. Airborne Particles and Scavenging Mechanisms (3) R. B. Rebe Lecture—3 hours. Prerequisite: Engineering 103A, 109A, courses 141, 149, or consent of instructor. Generation, characterization and behavior of small particles and droplets suspended in gas including deposition and scavenging of airborne particles in the earth's atmosphere.

234. Water and Waste Treatment (3) I. Schröder Lecture—3 hours. Prerequisite: course 243A; consent of instructor. Introduction to course 243A.

244. Environmental Quality Modeling (3) I. J. Obro Lecture—3 hours. Prerequisite: one of courses 141, 241, or 242A (may be taken concurrently). Mathematician modeling of environmental quality, with emphasis on mathematical models of quality, their structure, capabilities and limitations, sensitivity and reliability, as analytical and/or predictive tools.

245. Applied Environmental Chemistry (3) I. D. Darby Lecture—3 hours. Prerequisite: Engineering 105A; Chemistry 141–16; or the equivalent of course 141 and 140L, or the equivalent. Chemistry of natural and polluted waters. Chemical and kinetic principles of water purification processes, oxidation and reduction, and interfacial phenomena.

246. Pilot Plant Laboratory (3) I. D. Darby Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

248. Design of Natural Systems for Wastewater Treatment (3) I. D. Smith Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewaters. Emphasis is placed on the practical application of principles developed in core courses 243A and 243B plus new information related to natural systems. Offered in odd-numbered years.

250. Transportation Policy Planning (3) I. L. Sperling Lecture—3 hours. Prerequisite: course 152; course 150 (may be taken concurrently). Socio-technical nature of transportation. The societal, technical, and system bases for planning transportation developments. Policy framework of transportation development and characteristics of transportation planning. Development of objectives, policy alternatives, and programs and factors and considerations involved in evaluations and decisions. Offered in odd-numbered years.

251. Transportation Demand Analysis (3) I. K. Itamura Lecture—3 hours. Prerequisite: course 144 or the equivalent. Behavior and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterize of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using large-scale data sets obtained from home interview surveys.


256. Urban Traffic Management and Control I (3) I. I. K. Itamura Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicular traffic congestion; roadway capacity; intersection design and traffic signal operations; freeway operations and management; corridor control.

257. Urban Traffic Management and Control II (3) I. I. K. Itamura Lecture—3 hours. Prerequisite: course 256. Microscopic and macroscopic traffic stream models; traffic signal delay models; queuing theory applications. Traffic signal control models; traffic flow modeling and applications to traffic control systems. Offered in odd-numbered years.

258. Transportation Planning in Developing Countries (3) I. L. Sperling Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis is on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of differing socioeconomic, geographic, and institutional settings. Offered in even-numbered years.

259. Advanced Highway Technology and Automation (3) I. K. Itamura Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of policies impacted by various issues, driver response and pricing strategies and costs, and formulation of control theory.

270. Advanced Water Resource Management (3) I. L. Johnson Lecture—3 hours. Prerequisite: course 153 and 267 or the equivalent. Discussion of technical papers related to planning and operation of water resources. Regionalization, multi-objective methods, risk analysis, institutional issues, pricing, model application, economic development, forecasting, operations, and other topics.

271. Water Resources Planning Laboratory (3) I. L. Johnson Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, and principles of plan formulation and plan evaluation in conducting water resources planning studies.

NOTE: For key to footnote symbols, see page 133.
provide instruction on principles and methodology used in the laboratory study. Offered in odd-numbered years.

272A. Advanced Groundwater Hydrology (3) II. Marullo
Lecture—3 hours. Prerequisite: course 144 or the equivalent; Mathematics 110A recommended. Flow in confined, unconfined, and leaky aquifers. Hydraulics of pumping and recharging wells. Identification of aquifer parameters. Groundwater quality problems.

272B. Advanced Groundwater Hydrology (3) III. King

Lecture—3 hours. Prerequisite: course 153, Mathematics 131 or Statistics 131 A. Planning, design, and management of water resource systems. Application of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and storage and design and operation of reservoir systems. Surface water and groundwater management.

274. Hydraulics of Pipe Lines (3) II. Larock

275. Hydrologic Time-Series Analysis (3) III. Kavas
Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic processes using time series methodology. Offered in odd-numbered years.

276. Watershed Hydrology (4) II. Kavas
Lecture—4 hours. Prerequisite: course 142 or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation. Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope.

277. Unsteady Flow in Surface Waters (3) I. King

278. Hydrodynamics (3) 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 odd-numbered years.

279. Advanced Mechanics of Fluids (4) I. Larock
Lecture—4 hours. Prerequisite: course 141. Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Turbulence. Reynolds equations. Introduction to turbulence modeling. Offered in even-numbered years.

281. Advanced Soil Mechanics (3) I. Arulandan
Lecture—3 hours. Prerequisite: course 171. Consolidation, shear strength, pore water pressure measurement, pavement design tests, in situ tests. Offered in even-numbered years.

282. Physicochemical Properties of Soils and Soil Behavior (3) I. Arulandan
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 and soil-water characteristics. Laboratory includes electrical characterization of soils, optimization of electrical dispersion, and rotating cylinder tests.

284. Theoretical Soil Mechanics (3) III. Cherry
Lecture—2 hours. Prerequisite: course 171. Unified theory of stress-strain behavior of soil, consolidation and residual states, interpretation of laboratory tests, drained and undrained strain of soil, anisotropy, and time dependent behavior.

285. Pavement Design and Soil Stabilization (3) II. Shen
Lecture—3 hours. Prerequisite: course 171. Principles and methods of pavement design for highway and airport pavements; purposes, principles and methods of soil stabilization in foundation engineering. Offered in odd-numbered years.

286. Advanced Foundation Design (3) III. Shen
Lecture—3 hours. Prerequisite: course 173. Design and analysis of build-ups; deep excavation; tie-back systems for excavating in soft ground; loads on buried conduits; lateral pile loading capacity; pier foundations; additional topics of footing and raft design.

287. Dynamic Response of Soils (3) II. Idries
Lecture—3 hours. Prerequisite: course 171. Seismic survey, dynamic soil properties, analysis of the behavior of soils under earthquake conditions. Applications to liquefaction, seismic response of soil deposits; earth dams and other structures using one-dimensional and two-dimensional analysis procedures.

288-A. Selected Topics in Civil Engineering (1-5)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special topics with sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering. May be repeated for credit.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion of current graduate research areas and presentation of lectures on recent advances. Oral presentation of individual study course required of graduate degree candidates. (SU grading only).

290C. Graduate Research Group Conference (1) I, II, III. Chairperson in charge
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (SU grading only).

290G. 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 Civil Engineering (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in Civil Engineering. Participation as teaching assistant or associate-in designated engineering course. Methods of leadership discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (SU grading only)

NOTE: For key to footnote symbols, see page 133.
Courses in Engineering:

Electrical and Computer Science
(Courses in Electrical and Computer Science Engineering are listed below; courses in Computer Science Engineering are listed immediately following.)

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1) III. The Staff (Chairperson in charge) Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P/NP grading only.)

70. Computer Structure and Assembly Language (4) I, II, III. Matloff, Redbro Lecture—3 hours; computer workshop—3 hours. Prerequisite: proficiency in at least one high-level programming language. Introduction to computer architecture; machine language; assembly language; macros and conditional macros; subroutine/parameter passing; input/output programming; interrupt and trap routines; direct-memory access; absolute and relocatable code; re-entrant code; program development in an operating system.


92. Internship in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Work-learning experience—3–15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work-study experience in Electrical and Computer Science Engineering; may not be credited toward major requirements (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.)

98S. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

110A. Electronic Circuits (3) I. Spencer, Haley, Hurst Lecture—3 hours. Prerequisite: courses 70, 112, 140A. Engineering 100; course 111A concurrently required. Large and small signal device models; analysis and design of bias and gain stages; analysis and design of operational amplifiers.

110B. Electronic Circuits (3) II. Spencer, Haley, Hurst Lecture—3 hours. Prerequisite: courses 110A, 111A, 112; course 111B concurrently; course 140B recommended. Engineering and design of multi-stage and feedback amps; op-amp limitations and applications; active filters; oscillators; digital switches.

111A. Electronic Circuits Laboratory (1) II. Spencer, Hurst Laboratory—3 hours. Prerequisite: courses 112, 140A, Engineering 100; course 110A concurrently required. Design, analysis, and evaluation of transistor circuits, amplifiers, and op-amps.

111B. Electronic Circuits Laboratory (1) III. Spencer, Hurst Laboratory—3 hours. Prerequisite: courses 110A, 111A, 112; course 110B concurrently; course 140B recommended. Design, analysis, and evaluation of multi-stage and feedback amps, oscillators and switching circuits.

112. Linear Systems and Circuits (4) I. Abdel-Ghaffar, Levy, Ford, Chang Lecture—4 hours. Prerequisite: Engineering 17; Mathematics 22A. Characterization and analysis of linear systems and circuits. Time domain analysis by convolution techniques. Emphasis on frequency domain behavioral and state space transform, Fourier transform and Fourier series, with applications to electrical circuits.

114. Analog Integrated Circuits (3) I. Hurst, Spencer, Current Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis on bipolar transistor circuits. Single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers. (Former course 114A)

118. Digital Integrated Circuits (3) II. Hurst, Current Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B, 140B. Digital circuits. Design of 1-, 2-, and 4-bit circuits. Design of flip-flops and memory elements. Design of simple and medium complexity digital circuits. Emphasis is on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative flip-flops, RAMs, ROMs, and PLAs. (Former course 114B.)

130A. Introductory Electromagnetics (3) II. Dienes, Finke, Knoesen Lecture—3 hours. Prerequisite: Mathematics 22B and 22C. Physics 9C strongly recommended. Static electric and magnetic fields; time-varying electromagnetics.

130B. Introductory Electromagnetics (3) III. Finke, Dienes, Knoesen Lecture—3 hours. Prerequisite: course 130A and Engineering 17. Plane electromagnetic waves, transmission, reflection. Transmission lines. Not open for credit to students who have completed course 139.

131A. Electromagnetic Fields and Waves (3) I. Dienes, Finke Lecture—3 hours. Prerequisite: course 130B or the equivalent. Propagation and reflection of plane waves in isotropic media. Reflection and refraction of electromagnetic waves. Rectangular and circular wave guides.

131B. Electromagnetic Fields and Waves (3) II. Dienes, Finke Lecture—3 hours. Prerequisite: course 131A or the equivalent. Electromagnetic helix and wave structure. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Travelling wave amplifiers.

131C. Electromagnetic Fields and Waves (3) III. Dienes, Finke Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavities; microwave networks and components; antennas.

132A. High-Frequency Systems, Circuits and Devices (4) I. Branner Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130B. Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

132B. High-Frequency Systems, Circuits and Devices (4) II. Branner Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132A. High-frequency device analysis and design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistors and tunnel diode amplifiers.

134. Radar Systems and Signals (3) III. Branner Lecture—3 hours. Prerequisite: course 112; course 160 strongly recommended. Introductory course on radar systems and signals. Emphasis on analysis of practical radar system configurations and signals. The prediction of radar range performance, accuracy and resolution is discussed for a number of radar classes including: pulse, cw and pulse doppler.


139. Fields and Waves for Computer Majors (4) III. Dienes, Finke Lecture—4 hours. Prerequisite: Mathematics 22B, 22C; Physics 9C. Static electric and magnetic fields. Electromagnetic waves and transmission lines. Not open for credit to students who have completed course 130B.

140A. Fundamental Principles of Device Physics (3) I. Bowler, Churchill, Haley, Hunt, Kowel Lecture—3 hours. Prerequisite: Physics 9C. Semiconductor device fundamentals; equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, Fermi level, impurities, electric and magnetic fields, static and dynamic properties. Offered in odd-numbered years.

140B. Fundamental Principles of Device Physics (3) II. Bowler, Churchill, Hunt, Kowel Lecture—3 hours. Prerequisite: course 140A. Electrical properties, design, and models for Bipolar and MOS devices.

145A. Solid-State Electronics (3) III. Bower, Churchill, Sochoo, Haley, Hunt Lecture—3 hours. Prerequisite: course 145A. Magnetic properties of solids. Design of devices and their associated circuits utilizing the magnetic properties of solids. Devices studied include the ferrite core, ferrite isolator, magnetic media used in disk, tape, and bubbles and masers.

146A. Integrated Circuits Fabrication (3) I. Hunt, Bower Lecture—2 hours, laboratory—3 hours. Prerequisite: course 140B and 140B. BASIC assembly of metal-oxide-semiconductor MOS (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization. Procedures for producing metal-gate PMOS test chips which will undergo parametric and functional testing. (Former course 115A.)

146B. Advanced Integrated Circuits Fabrication (3) II. Hunt, Bower Lecture—2 hours, laboratory—3 hours. Prerequisite: course 146A. Fabrication processes for CMOS VLSI. Lab projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, alpha layer growth, thin gate oxides, and rapid thermal annealing. (Former course 115B.)

148. Superconductivity (3) III. Finke Lecture—3 hours. Prerequisite: course 130B or 140B. Fundamental properties of superconductors of the first and second kind. London and Ginzburg-Landau theories, Josephson effects, applications and devices.

150. Microprocessor-Based Instrumentation Systems (4) III. Soderstrand Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 and Engineering 100. Typical uses of microprocessors and microprocessor development systems in instrumentation applications. Analytical and design methods common to modern instrumentation systems including: transducers, dynamic

NOTE: For key to footnote symbols, see page 133.
response, signal conditioning, A/D conversion, data-transmission, hardware interfacing, software development, noise and safety.


152. Feedback Design of Uncertain Systems (3) I. Horowitz Lecture—3 hours. Prerequisite: course 112. Quantitative design of feedback systems to achieve prescribed stability despite large uncertainties in system parameters and competing disturbance inputs. Application to single input-output, linear time invariant, time varying and nonlinear systems. Minimization of the cost of feedback.

157A. Control Systems (3) I. Hsia, Dorf, Wang, Chang Lecture—3 hours. Prerequisite: course 112. Design and analysis of closed loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space methods; stability criteria.

157B. Control Systems (3) I. Hsia, Dorf Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Control system optimization and compensation techniques, digital control theory. Laboratory includes servo system experiments and computer simulation studies. Topic includes: filtering, spectral analysis, function circuits, A/D and D/A conversion, and digital communication systems.


161. Signal Processing (3) II. Ford Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 151, 160; Engineering 100. Design and implementation of analog and digital signal processing systems. Topics include: filtering, spectral analysis, function circuits. A/D and D/A conversion, and digital communication systems.


166. Digital Communications: Satellite, Microwave, Cable (3) III. Feher Lecture—3 hours. Prerequisite: course 160. Introduction to digital communications by satellite, microwave, and cable systems. Baseband signal processing techniques for digital MODEM (modulation-detection-demodulation). Principles and applications of QPSK, 64-QAM, and other MODEM in TDMA and SCPC satellite and terrestrial microwave systems.

167. Telecommunications Measurements and Instrumentation (3) III. Feher Lecture—3 hours. Prerequisite: course 160. Measurements and instrumentation for digital communications and signal processing systems. Analysis of bit error rate, noise and jitter measurement uncertainties. Digitized PCM voice and video speech and time measurements. Expert (artificial intelligence) applications. In-class experiments/demonstrations.

171. Introduction to Computer Architecture (4) IV, II, III, Park, Rebro Lecture—3 hours; discussion—1 hour. Prerequisite: course 70. Study of the interrelationship and interaction of various parts of computer systems including instruction sets, processing and control units, particularly microprogrammed control units, buses, input/output, arithmetic and logic processing, and memory system hierarchy. Dependence on CSCI 301 and CSCI 302.

172. Microcomputer-Based System Design (4) I, II, Lin Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 70, 176; course 177 (concurrently) recommended. 8086-based microprocessor architecture; bus-based system architecture; peripheral chip architecture; I/O interface design; interrupt driven system design; general system design procedure; MOS/DS operating system; comparison of different types of microprocessors.

175. Computer Devices and Systems (3) III. Sooch Lecture—3 hours. Prerequisite: course 140B. Characteristics and design of the essential components of a computer. Design of I/O, storage, memory, logic, and control units using devices with realistic rather than idealized characteristics emphasized. Advantages and disadvantages of alternative realizations are considered.

176. Digital Systems I (4) I, II, Lin Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems, and algorithmic state machine design.

177. Digital Systems II (4) I, II, Lin Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 110A-110B, 175. Multi-input/output sequential digital systems; time/pulse circuits; TTL, CMOS, ECL, log, and linear analog computer logic. A-D converters design; system noise; grounding, shielding, crosstalk, reflection; memory systems; CAD with PDP-11.

182A. Operating System Design I (4) I. Ruschitzka Lecture—3 hours; programming workshop—3 hours. Prerequisite: course 171. Architectural support of operating system concepts; systems programming; major components of an operating system, their functions, and their interactions. Lecture material coupled with programming project that involves a machine simulator and the implementation of matching multiprogramming system.

182B. Operating System Design II (3) II. Ruschitzka Lecture—3 hours. Prerequisite: course 182A. Introduction to probability theory course. Contemporary architecture: virtual memory and operating system support functions; Concurrent processes and problems of deadlock exclusion, deadlock detection, and synchronization; management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations.

184A-184B. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science; (B) Programming Systems; (C) Digital Systems; (D) Communications; (E) Signal Transmission; (F) Digital Communication; (G) Control Systems; (H) Robotics; (I) Signal Processing; (J) Image Processing; (K) High-Frequency Phenomena and Devices; (L) Solid-State Devices and Electronic Materials; (M) Systems Theory; (N) Active and Passive Circuits; (O) Integrated Circuits and Their Design; (P) Computer Engineering; (Q) Microprocessing; (R) 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 Science Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/N grading only.)

192. Internship in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Chairperson in charge) Work-experience—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work-study experience in electrical and computer engineering. 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

201. Digital Processing of Signals (4) II. Alagi, Friedland, Ford Lecture—4 hours. Prerequisite: course 151. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform, and Hilbert transforms. (Former course 204.)

202. Introduction to Optical Information Processing (3) II. Kowel 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.

205. Digital Image Processing (4) II. Alagi, Ford Lecture—4 hours; laboratory—3 hours. Prerequisite: course 151. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems.

207. Pattern Recognition and Classification (3) III. Ford Lecture—3 hours. Prerequisite: Statistics 131A or Mathematics 131, or the equivalent. Topics in statistical pattern recognition: Bayses decision theory; parameter estimation and supervised learning; nonparametric techniques; linear discriminant functions; unsupervised learning and clustering; feature extraction. Applications to image processing.


211. Advanced Analog Circuit Design (3) II. Spencer, Current, Huns 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) III. Huns, Spencer, Current Lecture—3 hours. Prerequisite: course 210 or 114A and consent of instructor. Analysis and design of analog MOS integrated circuits. CMOS process, MOS device modeling, passive components, single stage amplifiers, current sources, op amps, comparators, comparators, switched-capacitor filters, and analog-to-digital converters.

214A. Computer-Aided Circuit Analysis and Design (3) I. Haley, Current

NOTE: For key to footnote symbols, see page 133.
269. Quantum Electronics (3) II. Dienes, Fink Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B; knowledge of FORTRAN or C. Network equation formulations: nonlinear dc and linear ac circuit analysis. Calculation of dc and ac network sensitivities. Extensive computer project.

214B. Computer-Aided Circuit Analysis and Design (3) I. Current, Haley Lecture—3 hours. Prerequisite: course 214A. Transient (time-domain) analysis, harmonic analysis, statistical circuit analysis, time-domain network sensitivities, ac, dc, transient gradient calculations, design optimization. Extensive computer project.

218A. Introduction to VLSI Circuits (3) I. Current, Haley Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design example.

218B. Multiproject Chip Design (1) II. Current, Hurst, Spencer Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiproject chip layouts of projects begun in courses 218A, 212, and 219 are assembled and submitted to the DARPA NSF MOSIS program for fabrication.

216C. IC Testing and Evaluation (1) II. Current, Hurst, Spencer Laboratory—3 hours. Prerequisite: course 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testability are discussed.


220. Semiconductor Devices (3) III. Churchill, Bowler, Hunt Lecture—3 hours. Prerequisite: course 140B. Covers the physical principles, characteristics and models of various semiconductor devices including: P-N Junction and metal-insulator-semiconductor diodes, junction and insulated-gate field effect transistors.

221. Passive Filter Design (3) I. Soderstrand, Current, Haley Lecture—3 hours. Prerequisite: Engineering 100 and course 112 or the equivalent. Introduction to the design of passive filters with lumped and distributed elements. Filter specification and design process, approximation theory, modern doubly terminated networks, passive filters with lumped elements, crystal and ceramic filters, mechanical filters.

222. Active Filter Design (3) II. 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. Branner 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 low noise design. Theory and design of microwave transmitter and receiver circuits. Analysis and design of linear, loop, waveguide, and horn radiators.

226A. Quantum Electronics (3) II. Dienes, Fink Lecture—3 hours. Prerequisite: courses 130B and 140B. Some basic concepts of quantum theory, density operators, and path. Electric dipole transition; equation of motion of magnetic dipole; resonant processes, absorption, dispersion and saturation; transient behavior of electric dipole transition; radiated amplitude equations and rate equations. Offered in even-numbered years.

226B. Quantum Electronics (3) III. Dienes, Fink Lecture—3 hours. Prerequisite: course 226A. Lasers, masers: population inverision, threshold requirement, steady-state and transient behavior, Q-switching, interaction between oscillation and phonons. Offered in odd-numbered years.

227A. Microwave Electronics (3) II. Soohoo Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwaves, waveguides and cavities. Interaction between electromagnetic fields and the electronic charge. Lorentz force law, energy levels in matter and Zeeman splitting. Comparison between conventional and micro wave tubes and other new types of microwave oscillators and amplifiers. Offered in odd-numbered years.

227B. Microwave Electronics (3) II. Soohoo 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 even-numbered years.


230. Electromagnetics (3) I. Fink, Dienes Lecture—3 hours. Prerequisite: course 130B. Maxwell’s equations, plane waves, reflection and refraction, waves, propagation, electromotive force, power, dispersive media, losses, absorption, dispersion, propagation in dispersive media, laser beams and resonators.

231. Electromagnetic Theory (3) I. Dienes, Fink Lecture—3 hours. Prerequisite: course 131B; Applied Science Engineering 234A. Advanced topics in electrodynamics, including propagation in anisotropic and nonisotropic media.

232. Advanced Applied Electromagnetics (3) III. Branner Lecture—3 hours. Prerequisites: course 131B or 132B. Formal presentation of applied electromagnetic problems by using Green’s functions. Applications of these techniques to transmission circuits.


245A. Applied Solid-State Physics (3) I. Fink, Soohoo, Churchill, Kowel, Hunt Lecture—3 hours. Prerequisite: course 140B. Physics of solids relevant to solid-state applications. Topics include conduction mechanisms in semiconductors and transport phenomena in semiconductors, and photovoltaic and magnetism in solids.

245B. Applied Solid-State Physics (3) III. Churchill, Soohoo, Kowel, Hunt Lecture—3 hours. Prerequisite: course 245A or the equivalent. Theory of semiconductors with application to transistors. Topics include transport and recombination of excess carriers and semiconductor devices.

245C. Applied Solid-State Physics (3) III. Fink, Soohoo Lecture—3 hours. Prerequisite: course 245A. Theory of magnetism in solids, with application to ferromagnetic devices and circuits. Topics include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of individual magnetic elements and magnetic arrays.

246. Advanced Projects in IC Fabrication (3) III. Current, Hunt, Spencer Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. (Former course 215.)


248. Microsensor Design and Fabrication (3) Smith, Bower Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensor systems, including packaging. Offered in even-numbered years.

249. Microfabrication (3) III. Hunt Lecture—3 hours. Prerequisite: graduate standing in Engineering. Theory and practice 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 odd-numbered years.


251. Nonlinear Control Systems (3) II. Horowitz Lecture—3 hours. Prerequisite: course 250. Feedback systems with uncertain nonlinear plants; techniques for achieving performance tolerances; single input-single output (SISO) and multiple input-multiple output (MIMO); cost of feedback; dithered adaptive systems.


254. Digital and Sampled-Data Control System (3) II. Heil, Chang Lecture—3 hours. Prerequisites: courses 157A, 250 or the equivalent. Major topics in digital and sampled data control theory with applications to computer control system analysis and design. Frequency domain (z-transform) techniques, state space and statistical design methods. Offered in even-numbered years.


258. Optimization Techniques with Applications (3) II. Wang Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C and graduate status. Computer-aided optimization of single-variable and multi-variable
functions with and without constraints. Sequential search methods, gradient methods, linear and nonlinear programming. Typical applications in different disciplines.

259. Optimization of Dynamic Systems (3) III. Chang
Lecture—3 hours. Prerequisite: course 250. Introduction to dynamic system optimization techniques with applications. Calculus of variations, maximum principle, dynamic programming. Applications to various optimization problems in systems engineering. (S/U grading only)

260. Random Signals and Noise (4) II. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 160; course 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications.

262. Spectral Analysis (4) III. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: undergraduate course on linear systems and Fourier analysis (e.g., courses 112 and/or 160). Theory and methodology of empirical spectral analysis of random signals. Fundamentals of resolution, leakage, and reliability. Analog and digital methods. Parametric modeling and nonparametric methods. Cross-spectral analysis. Applications to detection and estimation.

263. Optimal and Adaptive Filtering (3) III. Gardner, Levy, Friedlander

264. Estimation and Detection of Signals in Noise (4) III. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detection of signals in noise, Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing.

266. Information Theory and Coding (3) III. Albagli, 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. Linear block and convolutional codes.

267. Digital Communications Engineering (3) I. Fehrer
Lecture—3 hours. Prerequisite: course 260. Concepts and system configurations. Principles and design of data transmission systems. Optimum transmitters/receivers for digital baseband and modulation systems. Design and application of QPSK, QAM, OQPSK and or error correction codes in ISDN satellite, microwave, and cable systems.

269. Advanced Digital Modulation Techniques (3) II. Fehrer
Lecture—3 hours. Prerequisite: courses 260 and 267. MODEM (modulator-demodulator) and signal-processing techniques. Design and selection of coder and decoder for digital satellite, microwave, mobile radio and cable systems. Study of predictive coded modems, computer-aided and hardware design of advanced communication systems and synchronization systems.

270. Computer Architecture (3) II. Matloff
Lecture—3 hours. Prerequisite: course 171 and Statistics 131A. Emphasis on quantitative analysis of design tradeoffs, optimization of resource usage, formal mathematical techniques and interactions between architecture and software.

271. Advanced Digital System Design (4) II. Lin
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 177. Topics in advanced design of arithmetic processors, high-speed digital design, design strategies, and division. Floating point processors. Pipeline processors. Laboratory involving design and construction of several elaborate hardware systems.

272. Advanced Switching Theory (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 171 and Computer Science 100. Topics in switching theory, synchronous and asynchronous sequential circuits. Theoretical study of Boolean functions and their transforms. Special realization techniques for combinational and sequential circuits.

273. Bit-Slice Microprocessor Systems (3) III. Lin
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 172 and 177. Literature search and comparison of the most popular bit-slice microprocessors. Microprogramming techniques for the design of control units. CPU microprogram control and a state machine concept for digital logic design; hardware emulation of microprocessor/microcomputer.

274. Parallel Computer Architectures (3) III. Matloff
Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining. Multiple-CPU parallelism, through array processors and multiprocessors, and through novel structures such as dataflow machines. Current research.

275. The Design and Analysis of Digital Sequential Machines (3) III. Redinbo
Lecture—3 hours. Prerequisite: Computer Science 100. Design of finite state sequential machine design, models and behavior; minimal and equivalent realizations; incompletely specified machines; serial and parallel decompositions; partition algebraic expressions; regular languages; linear sequential systems; controllability and observability; Turing machines; semigroups and machines.

276A. Introduction to Fault-Tolerant Computing (3) III. Redinbo
Lecture—3 hours. Prerequisite: course 176. Examination of current issues in design and analysis of fault-tolerant digital systems. Course covers basic fault-tolerant aspects of computer systems, hardware and software fault-tolerant. (S/U grading only)

276B. Introduction to Digital Fault Diagnosis (3) III. Redinbo
Lecture—3 hours. Prerequisite: course 176; Engineering 118. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults.

277. Real-Time Multiprocessor/Multitasking System Design (3) II. Feher
Lecture—2 hours; laboratory—9 hours. Prerequisite: courses 172, 177, 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 IRMX286 development system. Bus arbitration, design of basic real-time executive, and system design with IRMX289 real-time multitasking operating system.

282. Operating System Models (3) III. Ruschitzka
Lecture—3 hours. Prerequisite: course 182B; introduction to digital systems design. Survey of formal models that are used in study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orderings and Petri nets. Deterministic and probabilistic models for the evaluation of system performance measures.

287A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

290. Seminar I (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion and presentation of current research and development. (S/U grading only)

290C. Graduate Research Group Conference in Electrical and Computer Engineering I (1), II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (S/U grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only)

Professional Course

300. The Teaching of Electrical Engineering (1), II, III. The Staff Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only)

Courses in Engineering: Computer Science

Lower Division Courses

301. Basic Concepts of Computing (3) I, II, III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Not intended for students in physical sciences, engineering, or mathematics. (Not open for credit to students who have completed course 30, 30H, Engineering 5, or former course 8, 20, or Mathematics 29A)

302. 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 digital system and computer programming, algorithms, their design and efficiency. Basic programming design, running, debugging, testing of well-structured programs. Programming language Pascal will be used to solve simple problems. (Not open for credit to those who have completed Engineering 5 or Computer Science 30H, and only 2 units of credit allowed those who have completed course 10, former course 20 or Mathematics 19. Those who have completed Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science and Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence)

303. Honors Structure and Interpretation of Computer Programs I (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: major in Computer Science or Engineering or Electrical Engineering: Mathematics 16A or 21A (may be taken concurrently). More intensive treatment of material in courses 30-40. Mathematics SAT score 880 or above suggested. Mathematical foundations of computer science. Procedural abstraction, data abstraction, and modularity. The Scheme programming language is used. Design and analysis of algorithms are stressed. (Not open for credit to those who have completed Engineering 5 or Computer Science
98. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge) (P/N grading only)

99. Special Study for Lower Division Students (1-5). I, II, III. The Staff (Chairperson in charge) (P/N grading only)

Upper Division Courses

100. Discrete Structures (3). I, II, III. Archer, Kou Lecture—3 hours. Prerequisite: Mathematics 21C. Discrete structures and applications to various areas of computer science: mathematical models and mathematical reasoning, sets, relations, functions, methods of counting. (No credit allowed to those who have had former Electrical and Computer Science Engineering 170.)

110. Data Structures and Programming (4). I, II, III. Martel Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 or 40H or consent of instructor. Selective file structures. Dynamic information structures, linear data structures. Hash techniques, recursive algorithms, sorting and searching. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 130 or former Mathematics 139A.)

120. Automata Theory and Formal Languages (3). I, II. Archer, Kou; Ling Lecture—3 hours. Prerequisite: course 100. Finite automata and regular expressions, deterministic and nondeterministic automata, finite-state transducers. Regular sets, pumping lemma, closure properties, closure under complement, homomorphisms, derivatives, normal forms, ambiguity. Pushdown automata, pumping lemma and their relation to context-free languages. (Not open for credit to students who have completed former course 126 or former Mathematics 171.)

122. Algorithm Design and Analysis (3). I, II, III. Gursfeld, Martel Lecture—3 hours. Prerequisite: courses 100, 110, 115, and 120. Complexity of algorithms: worst-case and average-case, algorithms for searching, sorting, pattern matching, graph manipulation, combinatorial problems, introduction to NP-complete problems. (Not open for credit to students who have completed former course 123 or former Mathematics 129B.)

140. Programming Languages (4). I, II. Archer, Fisher Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Syntactic definition of programming languages. Syntactic and semantic rules; program structures including variables, data types, data abstractions, scoping, parameter disciplines, exception handling, compilation. Compilation of high-level languages. (Not open for credit to students who have completed former course 124 or former Mathematics 129C.)

142. Compilers (4). III. Archer Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140; course 160 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of compilers. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 181.)

150. Operating Systems and System Programming (4). Lecture—3 hours; discussion—1 hour. Prerequisite: Electrical and Computer Science Engineering 70; Electrical and Computer Science Engineering 171 strongly recommended. Basic concepts of operating systems and system programming: Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs.


160. Introduction to Software Engineering (4). I, II. Fisher, Levitt 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.

188. Information Systems (3). 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. Project-oriented, self-paced course. Emphasis on actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in even-numbered years.

170. Introduction to Artificial Intelligence (4). I. Levitt Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140 or experience with LISP recommended. Design and implementation of intelligent computer systems. LISP as a programming language for building symbolic processing systems. Knowledge representation and organization. Memory and inference. Problem-solving and natural language processing. (Not open for credit to students who have completed former course 128 or former Mathematics 174.)


175. Computer Graphics (4). I, II. Joy Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, Mathematics 22A. Principles of computer graphics. Current graphics hardware, elementary operations in two- and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems. Individual projects. (Not open for credit to students who have completed former course 127 or former Mathematics 173.)

189-A. 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) Computer Graphics; (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 to the extent permitted by the program.

92. Internship in Computer Science (1-5). I, II, III. The Staff Work-experience experience. Prerequisite: lower division standing. Project approval prior to period of internship. Supervised work experience in public or private sector. May be repeated for credit.

192. Research Group Conferences in Computer Science (1-5). I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: upper-division standing in Computer Science and Engineering; consent of instructor. Research group conferences. May be repeated for credit.

193. Internship in Computer Science (1-5). I, II, III. The Staff (Chairperson in charge) Work-experience experience. 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.
198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Preparation of thesis or tutorial. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Course

220. Theory of Computation (3) II. Linz
Lecture—3 hours. Prerequisite: courses 120 and 122. Theory of computation, the notion of effective procedures, computability, Turing machines, Post symbol manipulation system, models similar to digital computers, computational complexity and interactive programming. Credit for students who have completed the same topic under Electrical and Computer Science Engineering 289.

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. Gufeld, Martel
Lecture—3 hours. Prerequisite: course 122; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting, generating functions, estimating the growth of algorithms. Graph algorithms. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277A.)

222B. Advanced Design and Analysis of Algorithms (3) II. Gufeld, Martel
Lecture—3 hours. Prerequisite: course 222A. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP, NP-completeness, Cook-Levin theorem, vector space and graphs. Planar graphs: Whitney’s and Kuratowski’s theorems. Topological parameters: packings and coverings; Connectivity; Menger’s theorem. Hamilton graphs: Posa’s and Chvatal’s theorems. Graph factorization; Tutte’s theorem. Graph coloring; Brooks’ and Vizing’s theorem.

226. Computational Algorithms in VLSI (3) I. Kou
Lecture—3 hours. Prerequisite: course 122; Electrical and Computer Science Engineering 176. Application and inherent limitations of using VLSI to implement combinational algorithms; design and analysis of algorithms for the design of VLSI circuits; VLSI test set generation and simulation.

240. Programming Languages (3) I, II. Archer, Fisher
Lecture—3 hours. Prerequisites: courses 140, 142. Advanced topics in programming languages including: Stack machine semantics, formal verification, modularization, data flow languages, object-oriented languages, concurrent processing. Principles of programming language design.

242. Translation of Programming Languages (3) III. Archer, Fisher
Lecture—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars, compiler-constructors. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278B.)

243. Code Generation and Optimization (3) I. Fisher
Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code movement, loop optimization, common subexpression elimination, register allocation, optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 276C.)

244. Principles of Concurrent Programming (3) III. Olsen
Lecture—3 hours. Prerequisite: course 100, 150 or Electrical and Computer Science Engineering 182B. Fundamental concepts and applications of concurrent programming tools: speculation and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

247. Parallel Languages (3) I, III. Linz
Lecture—3 hours. Prerequisite: course 240. Language constructs for parallel computation; functional-programming, logic-programming, and related languages. Representation and implementation of task spawning and synchronization. Forms of parallelism, including explicit vs. implicit, AND vs. OR, and All-Solutions vs. Committed-Choice. Techniques of data flow, suspension, and implicit control, abstraction, deriving, and implementing. Mapping to architectures.

250A. Advanced Computer Architecture (3) I. Matloff
Lecture—3 hours. Prerequisite: course 150; Electrical and Computer Science Engineering 177, 171. Processor complexity; the relationship between processor and memory speeds; opportunities for parallelism.

250B. High-Performance Uniprocessing (3) II. Farnham
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) I, II. Park
Lecture—3 hours. Prerequisite: course 250A. Using parallelism to increase computational speed. Interconnection topologies; parallel programming paradigms; architecture-specific algorithms; synchronization; parallel operating systems.

252. Local Area Networks (3) II. Mukherjee
Lecture—3 hours. Prerequisite: course 152. Local area networks and their functions, structures, and access protocols; focus on performing 171, 170. Processing and output of multiple techniques in polling, ring, and random access networks. Also discussed are standards, examples, products, and recent directions in research.

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 and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

256A. Analytic Methods for Computer Systems Design (3) I. Matloff
Lecture—3 hours. Prerequisite: course 100, Electrical and Computer Science Engineering 171, Statistics 131A or the equivalent and Electrical and Computer Science Engineering 182A and 182B recommended. Use of simulation and queueing theory in computer design. Applications to memory hierarchies. File storage; cache organization; memory allocation. Only one unit of credit allowed to students who have completed former Electrical and Computer Science Engineering 186.

256B. Modeling and Analysis of Computer Networks (3) II. Matloff
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: buffer management policies, capacity planning, logical design, flow/control, congestion control, routing.

NOTE: For key to footnote symbols, see page 133.

260. Software Engineering (3) I. Fisher
Lecture—3 hours. Prerequisite: courses 140, 142, 160. Advanced techniques in systems specification, design, implementation, testing, and documentation. Application of techniques to large-scale software systems. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 289.)

261. Program Verification (3) I. Archer
Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Knowledge of an iterative and a functional programming language. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for employing automated deduction. Logic Background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs.

262. Formal Specification (3) II. Archer

265. Database Systems (3) I. Weiler
Lecture—3 hours. Prerequisite: course 165. Data models (especially relational and entity relation), performance measures, query languages and optimizers, database security and recovery, distributed systems. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 280.)

269. MUMPS Language (3) I. Weiler
Lecture—3 hours. Prerequisite: course 140. Review of MUMPS language; history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta language implementation, validation and performance measures.

270. Artificial Intelligence (3) II. Alvarado
Lecture—3 hours. Prerequisite: course 140; course 170 recommended. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and its understanding. Computer programming and problem solving. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 270.)

272. Cognitive Modeling (3) III. Alvarado
Lecture—3 hours. Prerequisite: courses 170 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of current methods in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

274. Automated Deduction (3) II. Archer
Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem-proving. Method based on resolution and term-rewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Offered in even-numbered years.

275. Computer Graphics (3) II. Joy
Lecture—3 hours. Prerequisite: course 175. Advanced topics in computer graphics. Hidden surface methods, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing techniques.

276. Advanced Raster Graphics (3) III. Joy
Lecture—3 hours. Prerequisite: course 275. Advanced topics in raster graphics techniques. Ray tracing models, advanced modeling techniques, shading, animation. Discussion of current research in the field.
Engineering: Mechanical

278. Computer-Aided Geometric Design (3) III. Joy Lecture—3 hours. Prerequisites: course 175; Applied Science Engineering 115 or Mathematics 128A. Mathematical techniques for the definition and manipulation of curves and surfaces. Coon's patches, Bézier curves and surfaces, B-spines, box-spines. 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) 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.)

299. Group Study (1-5) I, II, III. The Staff Lecture, laboratory, or combination. Prerequisite: consent of instructor. (SU grading only.)

Professional Course

300. The Teaching of Computer Science (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only.)

Engineers: Mechanical

(Graduate of Engineering)

Harry Brandt, Ph.D., Chairperson of the Department Department Office, 2020 Bader Hall (916-752-0580)

Faculty

James W. Baughn, Ph.D., Professor (Aeronautical Science and Engineering)
Enzo Bertolini, Ph.D., Adjunct Professor
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John W. Brewer, Ph.D., Professor
Steve Carchign, Ph.D., Lecturer
Jean-Jacques Chaudot, Ph.D., Professor
Harry A. Dwyer, Ph.D., Professor
Mohamed Haif, Ph.D., Professor
Andrew S. Fietz, Ph.D., Professor
Clyde F. Garland, M.S., Professor Emeritus
Warren H. Glise, Ph.D., Professor Emeritus
Jeffery C. Gibling, Ph.D., Associate Professor
John F. Gleise, J.D., Lecturer
Joanne Groza, Ph.D., Associate Professor
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Jerald M. Henderson, D.Engr., Professor (Mechanical Engineering, Food Science and Technology)
Ronald A. Hess, Ph.D., Professor (Aeronautical Science and Engineering)
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David G. Hottw, Ph.D., Associate Professor
Mont Hubbard, Ph.D., Professor (Aeronautical Science and Engineering)
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Ilan Kennedy, Ph.D., Associate Professor
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John Martzlan, Ph.D., Assistant Professor
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An Tzu Yang, D.E.Sc., Professor
S. Haig Zeronian, Ph.D., D.Sc., Professor (Textiles and Clothing)

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Joanna Groza, Ph.D., Associate Professor
David G. Hottw, Ph.D., Associate Professor
Amiya K. Mukherjee, Ph.D., Professor
Zubah A. Mughal, Ph.D., Professor
Howard L. Needles, Ph.D., Professor (Textiles and Clothing)
Subhash Rebbu, Ph.D., Professor
James F. Shackelford, Ph.D., Professor

NOTE: For key to footnote symbols, see page 133.

Steve Wortman, Lecturer
S. Haig Zeronian, Ph.D., D.Sc., Professor (Textiles and Clothing)

Courses in Engineering: Mechanical

(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 (Brandt in charge) Lecture—1 hour. Description of the field of mechanical engineering, with functional industrial applications; discussion of the practice with respect to engineering principles, ethics and responsibilities. (P/NC grading only.)

2. Internship in Mechanical Engineering (1-5) I, II, III. The Staff (Brandt in charge) Work-experience experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. (SU grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor; lower division standing. (P/NC grading only.)

Upper Division Courses

134. Vehicle Stability (4) III. Hubbard Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171 and Engineering 102B. 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 behavior.

150A. Mechanical Design (3) I, III. Beadle Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 104B, course 150L (may be taken concurrently). Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. The principles of engineering mechanics applied to fundamentals of mechanical design. Theories of statics and fatigue failure of materials. Design projects emphasizing the progression from conceptualization to hardware.

150B. Mechanical Design (4) I, II, Frank, Velinsky Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Principles of engineering mechanics, failure theories and fatigue theory applied to 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.

150L. Manufacturing Processes (2) I, II, III. Henderson Discussion—1 hour; laboratory—3 hours. Restricted to junior and senior Mechanical, Aeronautical, and Materials Science and Engineering majors, focusing on and experience with modern manufacturing methods and computer-aided manufacturing and their role in engineering design and development process.

151. Statistical Methods in Design (3) III. Beadle 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-strength interaction, reliability and fatigue under random loading.

152. Mechanism Design (3) III. Yang Lecture—3 hours. Prerequisite: Engineering 102A. Application of complex-number method to kinematic and dynamic analysis of planar 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.

162. Modern Power Systems (4) II. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of modern power systems for electric power generation and transmission. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

165. Fundamentals of Heat Transfer (4) I, II, McKillop, Dwyer Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Fundamentals of convection, conduction and radiation heat transfer; applications to engineering equipment with use of digital computers.


176. Measurement Systems (3) I, II. Valisky Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 102A; restricted to Aeronautical and Mechanical Engineering and Materials Science students. Theory of measurements; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

184A. Mechanical Engineering Design Project (2) I, II. The Staff Lecture—6 hours. Prerequisite: senior standing in Mechanical Engineering; consent of instructor. Performance of a major design project which includes design and possible development and evaluation of mechanical engineering system.

184B Mechanical Engineering Design Project (2) I, II. The Staff Laboratory—6 hours. Prerequisite: course 184A; consent of instructor. Performance of projects which include design and possible development and evaluation of a mechanical engineering system.

185. Mechanical Systems Design Projects (4) III. Henniker 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, 184-188). 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. Mantzars Lecture—3 hours; discussion—1 hour. Prerequisite: senior standing in Mechanical Engineering or Physics (enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, with an understanding of engineering and economic factors. Grading based on individual contributions to project. Limited enrollment.

187. Control Systems Design Project (4) III. Frank Lecture—3 hours; discussion—1 hour. Prerequisite: course for electric power generation and cogeneration engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of plants, consideration of passive, open loop, and closed loop active solutions. Grading based on individual contributions to projects.

188. Vehicle Systems Design Project (4) I. Frank Lecture—2 hours; laboratory—3 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of vehicle systems, such as chassis and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to project. Limited enrollment.

192. Internship in Engineering (1-5) I, II, III. The Staff (Brandt in charge) Lecture—work-experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Brandt in charge) Lecture—consultant of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses


206A. Experimental Methods in the Thermal Sciences (3) I. Brandt Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Experiment design, statistics uncertainty analysis. steadystate and transient temperature measurements. steady state flow and pressure measurements.

208B. Experimental Methods in Fluid Mechanics and Combustion (3) III. Kennedy Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Experimental methods in fluid mechanics. Introduction to hotwire anemometry and its application to the measurement of turbulent flow. Introduction to data acquisition of fluid mechanics measurements. Offered in odd-numbered years.

209C. Experimental Methods in Fluid Mechanics and Heat Transfer (3) III. White Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 103B. Measurements in fluid mechanics using experimental techniques to determine flow direction, wall shear stress, turbulence quantities, etc. Introduction to hotwire anemometry and its application to the measurement of turbulent flow. Introduction to data acquisition of fluid mechanics measurements. Offered in odd-numbered years.

210A. Advanced Fluid Mechanics and Heat Transfer (4) I. McKillop Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 100B, 105B, course 165. Development of differential equations governing continuity, momentum, and energy transfer. Solutions in laminar flow for exact cases, low and high Reynolds numbers and lubrication theory. Dynamics of inviscid flow.

210B Advanced Fluid Mechanics and Heat Transfer (4) II. Dwyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer.

210C. Advanced Numerical Fluid Mechanics (4) II. Dwyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 210B. Development and solution of basic

finite difference and finite volume equations which describe fluid flow and heat transfer for mechanical and aeronautical applications. Applications to combustion, pipe flows, high Pecllet number heat transfer, and the full Navier-Stokes equations. Complex grid generation.

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 free convection; heat exchangers; fouling; flow over airfoils and blades. Offered in odd-numbered 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 odd-numbered years.

213. Advanced Turbulence Modeling (4) I. Kollmann Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and turbulence equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered in even-numbered years.

214. Advanced Thermodynamics (4) I. Mantzars Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105B. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics and quantum statistical mechanics of nonreacting and chemically reacting gases, gas mixtures, and other substances.

217. Combustion (4) II. Kennedy Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Review of chemical thermodynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena: detonations; laminar flame structure and turbulent combustion.

218. Advanced Energy Systems (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, or the equivalent. Review of topics available for advanced energy systems. Detailed study of basic power balances, component efficiencies, and overall plant performance for one advanced concept such as a fusion, magneto-hydrodynamic, or solar electric powerplant. Offered in even-numbered years.

220A-220B. Mechanical Vibrations (3-3) II-III. Kamopp 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. Kamopp Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

224. Kinematic Design of Mechanisms (3) II. Yang Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Introduction toBernstein theory of the rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curvature analysis, circle- and center-point curves. Graphic and computer methods for kinematic design. Offered in even-numbered years.
223. Spatial Kinematics and Robotics (3) II. Yang Lecture—2 hours, discussion—1 hour. Prerequisite: 222 consent of instructor. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in odd-numbered years.

226. Acoustics and Noise Control (3) I. Hubbard Lecture—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in even-numbered years.

250. Project Engineering (3) II. Henderson Lecture—2 hours; discussion—1 hour. Planning, organization, and management of engineering projects. Studies of selected problems which illustrate the design process and management methods in advanced mechanical engineering systems. Experience with leading a project.

255. Computer-Aided Design and Manufacturing (3) III. Rawlin Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 180 or course 150B. Proficiency in a high-level programming language such as FORTRAN, Pascal, or C. Studies of computational and computer graphics techniques and their applications in design and manufacturing. Use of numeric and geometric methods in design and manufacturing.

270. Modeling and Simulation of Engineering Systems (3) I. Kopp Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multiscale models of mechanical, electrical, thermal, and hydraulic systems; bond graphs, block diagrams, and state space equations; hybrid systems; neural networks; realistic simulation of mechanical systems; identification, instrumentation, approximate models of distributed systems.

271. Design of Multivariable Control Systems (3) II. Margolis Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design. Introduction to the design and evaluation of dynamic feedback systems. Stress on practical application of theory to engineering systems in various energy domains.


274. Analysis and Design of Digital Control Systems (3) III. Hess Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effect; space vector application to aircraft. 276A. Digital Data Acquisition and Analysis (3) I. Gibeling Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and minicomputers to data acquisition and control. Topics include hardware organization, firmware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, development of digital techniques for data acquisition and control, and basic data analysis.

276B. Digital Data Acquisition and Analysis (3) II. Frank Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5, 118, and 180; course 176. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characterization of linear dynamic systems.

277. Computer-Aided Design of Nonlinear Dynamic Systems (3) III. Margolis Lecture—4 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph processor programs FORTAN and CAMP and are used with advanced continuous system modeling programs to simulate the dynamic response of engineering systems.

280. Advanced Engineering Analysis (3) I. Brandt Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, numerical solution of differential equations, and advanced numerical methods.

289A-289B. Special Topics in Mechanical Engineering (1-5) I, II, III, Hull Lecture—1-5 hours. Prerequisite: consent of instructor. Special topics in (289A) musical instrument design, vibromechanics; (289B) orthopaedic biomechanics.

290C. Graduate Research Conference (1) I, II, III. The Staff (Brandt 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 grades only)

295. Design Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in system theory and control with presentations by individual students. (SU grading only)

296. Fluid and Thermal Sciences Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and trends in fluid mechanics and thermal sciences. (SU grading only)

297. Dynamic Systems and Control Theory Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in system theory and automatic control with presentations by individual students. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Brandt in charge)

299. Research (1-12) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor. (SU grading only)

Professional Course

390. The Teaching of Mechanical Engineering (1) I, II, III. The Staff (Brandt in charge) Discussion—2 hours. Prerequisite: meet qualifications for teaching assistant and/or associate-in-charge.

NOTE: For key to footnote symbols, see page 133.
duction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications.

138B. Aircraft Engines Systems Design (4) III. Hoffman
Lecture—4 hours. Course: 138A. Presents a realistic exposure to the entire aircraft engine system requirements and to the detailed design of components. Provides a broad understanding of internal aerodynamics, and emphasizes the relationships of analytical tools, iteration, and judgment.

161. Gas Dynamics (4) III. Steger
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 138A. Presents a realistic exposure to the entire aircraft engine system requirements and to the detailed design of components. Provides a broad understanding of internal aerodynamics, and emphasizes the relationships of analytical tools, iteration, and judgment.

180. Directed Group Study (1-5) I, II, III. The Staff (Brandt in charge)
Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Brandt in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

200. Advanced Aerodynamics-Inviscid Flow (4) I. Hafez

232. Advanced Aerodynamics-Viscous Flow (4) I. van Dam
Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers, laminar-boundary-layer instability and transition, separation, viscous/viscous interaction, three-dimensional flows and computational methods and their application. Offered in even-numbered years.

234. Computational Aero- and Fluid Dynamics (4) I, II, III. Hafez
Lecture—4 hours. Prerequisite: Engineering 103B. Introduction to computational fluid dynamics in nature, fundamental of turbulence in atmospheric flows, planetary boundary layers, wind effects on man-made objects, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in odd-numbered years.

237. Analysis and Design of Composite Structures (4) III. Rainforth
Lecture—3 hours; discussion—1 hour. Prerequisite: course 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes.

275. Advanced Topics in Aircraft Stability and Control (3) III. Hess
Lecture—3 hours. Prerequisite: course 129 or Mechanical Engineering 104E, and Mechanical Engineering 129 (or equivalent). Analysis of aircraft modes of motion; response to control actuation; time and frequency domain descriptions; response to random inputs—turbulence description; autopilot and stability augmentation system design; pilot/vehicle analysis; handling qualities. Offered in even-numbered years.

289A-G. Special Topics in Aerodynamics (4) III. van Dam
Lecture—4 hours. Prerequisite: consent of instructor.

One of the following topics: (A) Unsteady Aerodynamics and Flutter Analysis; (B) Advanced Aerodynamic Design and Optimization; (C) Wind Tunnel Testing and Wall Interference; (D) Hypersonic Flow; (E) Rarefied Gas Dynamics; (F) Aerodynamic Boundary Layers; (G) Nonlinear Stability Theory and Transition to Turbulence. Offered in odd-numbered years.

290C. Graduate Research Conference (1) I, II, III. The Staff (Brandt 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 (1-5) I, II, III. The Staff (Brandt in charge)
Prerequisite: consent of instructor. (SU grading only)

299. Research (1-12) I, II, III. The Staff (Brandt in charge)
Prerequisite: consent of instructor. (SU grading only)

Professional Course

310. The Teaching of Aeronautical Science and Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assignments and in Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only)

Courses in Materials Science and Engineering

Upper Division Courses

130. Thermodynamics of Materials Processes (3) I. Muhlerger
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, semiconduction, thermoelectric power and thermionic energy conversion.

132. Structure of Engineering Materials (3) I. Howell
Lecture—3 hours. Prerequisite: Engineering 45; upper division standing in Engineering. Structure of engineering materials on the atomic scale will be described by exploring the fundamental structures of crystallography. The importance of this structure to materials' properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques.

132L. Structure of Materials Laboratory (1) I. Howell
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.

134. Rate Processes in Materials Science (3) III. The Staff
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.

134L. Rate Processes in Materials Laboratory (1) I. The Staff
Laboratory—3 hours. Prerequisite: course 134 concurrently. Laboratory experiments to illustrate fundamental principles of diffusion, solidification, recrystallization, precipitation, evaporation, sintering and phase transformations in materials.

138. Mechanical Behavior of Materials (3) I. Muhlerger
Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic aspects of the mechanical behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined.

138L. Mechanical Properties Laboratory (1) I. Muhlerger
Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigation and mechanical behavior of materials. Laboratory exercises emphasize fundamental relationships between microstructure and mechanical properties.

140. Materials in Engineering Design (3) III. Gibling Laboratory—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Descriptive treatment of common engineering materials. Discussion of design parameters of typical materials including metals, ceramics, glasses, polymers, and composites. Principles of heat treatment and fabrication as they affect design parameters and applications in engineering will be emphasized.

140L. Materials Selection Laboratory (1) III. Gibling 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 properties. Consideration given to the role of property control in materials selection.

142. Principles of Nondestructive Testing (3) II. The Staff
Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing using radiological, ultrasonic, electrical, magnetic, penetrant methods, etc., are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical homogeneity, residual stress analysis, etc., are emphasized.

142L. Nondestructive Testing Laboratory (1) II. The Staff
Laboratory—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
Laboratory—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

144L. Corrosion Laboratory (1) I. The Staff
Laboratory—3 hours. Prerequisite: course 144 concurrently. Laboratory experiments to demonstrate corrosion behavior of materials in aqueous and high temperature environments. Relationship between corrosion behavior and fundamental principles and theories emphasized.

147. Principles of Polymer Materials Science (3) II. The Staff
Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45. Introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Textiles and Clothing 100.)

148. Materials Engineering Design Project (3) I, II, III. The Staff
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 140 may be taken concurrently. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

NOTE: For key to footnote symbols, see page 133.
199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor. P/NP grading only.

Graduate Courses


230L. Laboratory for Electron Microscopy (2) II. Hewitt Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered in even-numbered years.

232. Advanced Topics in Transmission Electron Microscopy (3) III. Hewitt Lecture—1 hour; discussion—2 hours. Prerequisite: course 230. Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Offered in odd-numbered years.

232L. Advanced Topics in Transmission Electron Microscopy (2) II. Hewitt Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232 concurrently. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in odd-numbered years.

240. Transport Phenomena in Materials Processes (3) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering, consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms and precipitates. Effects of stresses and impurity clouds are discussed. Offered in even-numbered years.

242. Advanced Mechanical Properties of Materials (3) III. Mukherjee Lecture—3 hours. Prerequisite: course 138 or consent of instructor. Stress and strength of engineering materials. The dependence of their mechanical properties on time, stress, and temperature. Generalized concept of dislocation theory in plastic deformation, including fracture and creep. Influence of microstructure in optimizing the mechanical strength properties. Offered in odd-numbered years.

243. Kinetics of Phase Transformation in Engineering Materials (3) II. The Staff Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 130 recommended. Theory of alloying, kinetics of phase changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in even-numbered years.

244. Interaction of Materials and their Environment (3) I. Munir Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Chemical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion: microbiological and atmospheric corrosion. Offered in even-numbered years.

245. Advanced Topics in Structure of Materials (4) III. Shadbolt Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering or consent of instructor; courses 138 and 142 recommended. Nature of microstructure in engineering materials will be explored. Crystallographic 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 odd-numbered years.

247. Advanced Thermodynamics of Solids (3) I. Munir Lecture—3 hours. Prerequisite: course 130 or the equivalent. Thermodynamics of gas-solid reactions and solutions; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in odd-numbered years.

248. Fracture of Engineering Materials (3) I. Gibeling Lecture—3 hours. Prerequisite: course 138. Descriptions of failure of materials by crack propagation. Topics include elastic-plastic fatigue, Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in even-numbered years.

249. Mechanics of Fatigue (3) I. Gibeling Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, stage I crack growth, threshold effects and high temperature cyclic deformation. Offered in even-numbered years.

250F. Special Topics in Polymer and Fiber Science (3) III. Zeronian Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer science and fiber science. Topics will vary each time the course is offered. (Same course as Textiles and Clothing 250A-F)

290C. Graduate Research Conference (1) I, II, III. The Staff (Brandt 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. (SU grading only.)

294. Materials Science Seminar (1) I, II, III. Shackelford, Mukherjee, Munir, Hewitt, Gibeling Seminar—1 hour. Prerequisite: graduate student in good standing. Review and discussion of current literature and developments in materials science with presentations by individual students. (SU grading only.)

299. Introduction to the Surface Science of Solids (3) II. Farraris Lecture—3 hours. Prerequisites: courses 130 and 132, or the equivalent. Thermodynamics of surfaces, terrace and kink model. Surface diffraction methods: LEED, READ, and TEM. Electron emission from surfaces; Auger, FIM, SEM, and scanning tunneling microscopy. Chemical analysis using ESCA, AES, HBS, and RIXE. Applications to thin films and coatings. Offered in even-numbered years.

299. Research (1-12) I, II, III. The Staff (Brandt in charge) Prerequisite: consent of instructor. (SU grading only)

Professional Course

390. The Teaching of Materials Science (1) I, II, III. The Staff (Brandt in charge) Discussion—1 hour. Prerequisite: must qualifications for teaching assistant and/or associate-in- mechanical engineering. Participation as a teaching assistant or associate-in in a designated instruction 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 grading only.)

English

College of Letters and Science

Ph.D., Chairperson of the Department
Department Office, 114 Sprout Hall (916-752-2257)

Faculty

William E. Baker, Ph.D., Professor
Max Byrd, Ph.D., Professor
Evelyn Carter, Ph.D., Professor Emeritus
Christopher Christof, Ph.D., Assistant Professor
Peter A. Dale, Ph.D., Professor
Elliot L. Gilbert, Ph.D., Professor
Sandra M. Gilbert, Ph.D., Professor Emeritus
Thomas A. Hanzo, Ph.D., Professor Emeritus
Wayne Harsh, Ph.D., Professor (English, Linguistics)
Emeritus
John O. Hayden, Ph.D., Professor
Peter L. Hays, Ph.D., Professor
Jack Hicks, Ph.D., Associate Professor
Michael J. Hoffman, Ph.D., Professor
Robert H. Hopkins, Ph.D., Professor
Michael P. Kramer, Ph.D., Assistant Professor
Richard A. Levin, Ph.D., Associate Professor
Kari E. Lokke, Ph.D., Assistant Professor
Clarence Major, Ph.D., Professor
Arthur E. McGuinness, Ph.D., Professor
Sandra J. McPhee, Ph.D., Assistant Professor
Patricia L. Moran, Ph.D., Assistant Professor
Linda A. Morris, Ph.D., Lecturer
James J. Murphy, Ph.D., Professor
Marjorie Ostrom, Ph.D., Professor
David A. Robertson, Ph.D., Associate Professor
Winfried Schleiner, Ph.D., Professor
Gwendolyn Schwabe, M.A., Senior Lecturer
Karl J. Shapiro, Professor Emeritus
Daniel Silva, Ph.D., Associate Professor
Gary Snyder, B.A., Professor
Margit K. Stange, Ph.D., Assistant Professor
Elizabeth Tallent, B.A., Associate Professor
David Van Leer, Ph.D., Associate Professor
Raymond B. Waddington, Ph.D., Professor
Strom Weber, Ph.D., Professor of American Literature Emeritus
Alain B. Williamson, Ph.D., Professor
James L. Woodress, Ph.D., Professor Emeritus
Celeste T. Wright, Ph.D., Professor Emeritus
Kari F. Zender, Ph.D., Professor

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect; thus it is a preparation for careers in writing, teaching, and editing, or for any role in which clear communication is important. The program offers its majors several options. A student majoring in English may elect the general study of English and/or American literature or may choose to emphasize Teaching or Writing.

Faculty-student interaction is encouraged by participation in the English Club, which meets once a quarter, often in a faculty home. Qualified creative writing students may gain valuable experience for academic credit by helping to edit the Department's nationally known California Quarterly.

A.B. Degree Requirements:

Preparatory Subject Matter: 24

English 45, 24

English 30A, 30B, 30C, 30D: 20

Depth Subject Matter (either emphasis, see below): 44

Core requirement: 28
Minor Program Requirements:

UNITs

English

20

Five upper-division courses, four of which will be literature courses.

Campus Writing Center. The Campus Writing Center, an affiliation that we have established, is a program designed to provide writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course all relate to the subject matter of the companion course. These courses are offered in cooperation with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should contact the Campus Writing Center, telephone 916-752-8924, 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 to courses 30A, 30B, 45A, 46A, 46B, and 46C, and all upper division courses. One information class recommend- ed as preparation for the 30 and 46 series. Students taking course 30A, 30B, 45A, 46A, 46B, or 46C for General Education credit must substitute Comparative Literature (C.L.) 1 or 3.

Meeting for Majors. All English majors are required to attend a general meeting for majors at the beginning of each year; all new and transfer English majors are required to attend a general meeting for majors at the beginning of their first quarter in residence; all English majors must see their advisers, individually, in the spring quarters of their sophomore and junior years.


Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees, and should consult with the graduate adviser.

Honors and Honors Program. The honors program consists of four units of 194H and four units of 195H, normally taken in the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility for the program and application materials may be obtained at the Undergraduate Office, 222 Sproul Hall. Refer to the Academic Information section and the College section for Dean's Honors List information.

Teaching Credential Subject Representative. G.T. Schwab. See also under Teacher Education Program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Information may be obtained from the graduate adviser or the Chairperson of the Department.

Graduate Adviser. D.A. Robertson.

Courses in English

Lower Division Courses

A. Language Skills (2) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Introductory course to help students gain writing proficiency for successful University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a letter grade. Minimum passing grade is a C; students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (0) I, II, III. The Staff (Chairperson in charge)

Lecture—4 hours. Workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students whose native language is not English and who need to strengthen basic skills before taking English A. Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

1. Expository Writing (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made. (CAN Eng 2)

3. Introduction to Literature (4) I, II, III. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Introductory study of several genres of English literature, emphasizing both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. General Education credit: Civilization and Culture/Introductory.

4. Critical Inquiry and Literature: Freshman Seminar (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement and consent of instructor; enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, class-room dialogue, and the writing of several papers or a longer seminar paper. General Education credit: Civilization and Culture/Introductory.

5F. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

5P. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

20. Intermediate Composition (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: course 1 or 3. Emphasis on the grammatical patterns of standard English, sentence structure, development of coherent paragraphs, and the formal properties of the expository essay.

21. Introduction to Reading and Composition in ESL (5) I, II. The Staff (Chairperson in charge)

Lecture-discussion—5 hours. Prerequisite: enrollment by placement examination only. Course provides undergraduate students whose native language is not English with intensive work in reading for factual information and in writing organized, coherent, and grammatically correct paragraphs. Students also study elements of the academic essay. (P/NP grading only.)

22. Reading and Composition in ESL (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: enrollment by placement examination or by successful completion of course 21. Course provides undergraduate students whose native language is not English with experience in writing complete short essays in recognized rhetorical modes, such as definition, comparison, and analysis. Students also read for reference and work on sentence structure. (P/NP grading only.)

23. Advanced Reading and Writing in ESL (4) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: enrollment...
ment by placement examination or by successful completion of course 22. Course provides students whose native language is not English with experience in the international traditions of English language, logic, and with writing persuasive essays. Students also asked to read for tone, style, context, and assumptions. (P/NP grading only.)

25. English for Foreign Students (5) I, II, III, S

Schwalbe

Lecture—3 hours; laboratory—4 hours. Prerequisite: enrollment by examination in English placement; open to international and domestic students only. Course develops skills needed by the graduate student: note-taking on lectures and written academic discourse, writing logically developed essays accurately using research, and thinking strategically in collective writing, systematically extending vocabulary, and writing a research paper.

26. English for Foreign Students (5) II, III, S

Schwalbe

Lecture—3 hours; laboratory—4 hours. Prerequisite: satisfactory completion of course 25; open to international graduate students only. Continuation of work in course 25, with additional focus on oral skills.

28. Introduction to Library Research (2) I, II, III, S

Librarian (staff charge)

Lecture—1 hour, practicum—3 hours. Methodology of research in libraries: catalogs, indexes and abstracts, bibliographies, computers, reference books, and specialized sources. Emphasis on preparation of detailed bibliographies for term papers, reports, offered in conjunction with campus libraries. (P/NP grading only.)

30A. Survey of American Literature (4)

I. Hayden

Lecture—3 hours, discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1865. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng 14)

30B. Survey of American Literature (4)

II

Lecture—3 hours, discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng 16)

45. Close Reading of Poetry (4) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng Seq B)

46A. Masterpieces of English Literature (4)

Scholler

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1640. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng Seq B)

46B. Masterpieces of English Literature (4) I, II, III

Hayden

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1640 to 1832. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng Seq B)

46C. Masterpieces of English Literature (4) I, II, III

Craft

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1832 to the present. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Eng Seq B)

92. Internship in English (1-12) I, II, III. The Staff

(Chairperson in charge)

Fieldwork—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III

The Staff (Chairperson in charge)

Prerequisite: course one from 1 or 3. (P/NP grading only.)

98. Special Study for Undergraduates (1-5) I, II, III

The Staff (Chairperson in charge)

(P/NP grading only.)

Upper Division Courses

100F. Creative Writing: Fiction (4) I, II, III, III. The Staff (Chairperson in charge)

Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; prior knowledge in 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, Hicks

Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; prior knowledge in 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 5F or 5P, or consent of instructor; prior knowledge in English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

120. 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 one or more specified academic disciplines. May be repeated once for credit if taken in conjunction with a different subject-matter course.

103A-Q. 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 103 recommended. Instruction and practice in a variety of modes of composition. Frequent written assignments. One area required of teaching credential candidates (section "P" strongly recommended). Study areas are: (A) General, (B) Legal Writing, (C) Article Writing, (D) Report Writing, (E) Technical Writing, (F) Composition for Elementary and Secondary Teachers, (G) Pre-Professional Writing. May be repeated once for credit if taken in different subject areas.

104. Scientific Writing (1-3) I, II, III

The Staff (Chairperson in charge)

Lecture—2 hours; discussion—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing; research methods, organization, proper style and format, oral presentation of scientific papers. Lecture and workshop-discussions by English and science department staff. May be repeated for a total of 4 units of credit. (P/NP grading only.)

105A. Language (4) I, II

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.

105C. Language Change Reflected In Literature (4) I, II

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of literary texts from the various historical periods in the English language, considering, in addition to other stylistic features, those characteristics particularly connected with development and change in the respective linguistic periods.

105D. Linguistics, Literature, and Composition (4)

Lecture-discussion—3 hours; term paper. Prerequisite: courses 105A and 105B. Linguistic theories and methods in literary analysis and in composition. Course considers structural linguistics and transformational grammar exemplified in analysis, criticism, and content of biblical and non-biblical written materials.

107. Special Topics in English Language (4)

Seminar—3 hours; special project. Prerequisite: course 1 or 3. Investigation of varied subjects in contemporary and historical English language studies. May be repeated for credit when a different topic is selected.

110A. Introduction to Principles of Criticism (4)

I. Hayden

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) II, Scholler

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

I. Osborn

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major types, traditions, and conventions of literature in England from the time of Beowulf to the late medieval romances, with special emphasis on the heroic tradition. Consideration of its impact, and the development of Arthurian literature. Mostly in translation.

113A. Chaucer: Troilus and the "Minor" Poems (4)

Il

Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, Troilus and Criseyde. Courses 113A and 113B are not available in sequence.

113B. Chaucer: The Canterbury Tales (4)

I

Lecture—3 hours; term paper. Prerequisite: course 1 or 3. The Canterbury Tales complete as a work of art: Chaucer's love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer. Courses 113A and 113B need not be taken in sequence.

116. Sixteenth-Century Poetry and Prose (4)

I

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Poetry of Skelton, Wyatt, Surrey, Sidney, Spenser, Marlowe, and Shakespeare; selection of other prose works. Discussion of political, religious, and intellectual background.

117A. Shakespeare: The Early Works (4) II

Zander

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's early period, up to 1599. Courses 117A and 117B-117C need not be taken in sequence.

117B. Shakespeare: The Middle Period (4)

I

Scheiner; II. Waddington; III. Zander
117C. Shakespeare: The Later Works (4) L. Levin
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's later period, up to 1604. Courses 117A-117B-117C need not be taken in sequence.

118. Shakespeare (4) I.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works by Shakespeare. Recommended for non-majors. May not be applicable toward English major. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

120. Earlier Seventeenth-Century Poetry and Prose (4) L. Levin
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. Waddington
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major works, including Paradise Lost.

123. The Age of Swift and Pope: Prose and Poetry (4) L. Levin
Lecture-discussion—3 hours; term paper or the equivalent. Prerequisite: course 1 or 3. The Augustan Age: tradition and imagination. Readings in Swift, Addison, Steele, Defoe, Pope, Gay, Thomson, and others.

127. Prose and Poetry of the Later Eighteenth Century (4) III. 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: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

130. Early Romantic Literature (4) I. Hayden
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Byron, Shelley, Keats. Individualism and revolt.

132. Later Romantic Literature (4) I. Lokke
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Byron, Shelley, Keats. Individualism and revolt.

133. Early Victorian Literature (4) II. Page, T.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Tennyson, Browning, Arnold, and selected prose writers. The Victorian temple: the individual and society, the search for faith. The impact of scientific thought upon creative thinking.

134. Later Victorian Literature (4) II. L. Leckie
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Tennyson, Hopkins, and others. The Oxford movement, the Pre-Raphaelites; art and poetry; aestheticism and decadence; pessimism. Trends continuing into the Edwardian period.

135. British Literature from 1880 to 1918 (4) II. McCunn
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) I.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Literature of and about World War II. Major writers and movements.

138. British Literature from 1940 to the Present (4) II. Williamson
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Literature of and about World War II to the present. Major themes in the novel, poetry, and short story.

139. Modern Anglo-Irish Writers (4) II. Kramer
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. A range 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-influenced local traditions, dominant American forms (poems, sermon, history), and major writers (Anne Bradstreet, Edward Taylor, and others).

141. The American Enlightenment and its Reaction (4) I.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Flowing of American romanticism: the metaphorical tradition. Oriental and European antecedents, philosophical idealism and literacy achievement. Hawthorne and Melville; Emily Dickinson.

144. American Literature from 1865 to 1914 (4) III. Morris
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Religion, local color, social criticism, naturalism, fin de siecle aesthetics; Twain, James, Crane, Dreiser, Howells.

146. Modern American Literature: 1914-1940 (4) I. Zinzer
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) III. Hicks
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Contemporary fiction, 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) II.
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Development of the drama from its beginnings to Marlowe's mastery of stage and mystery plays; the morality tradition: Early comedy, tragedy, and chronicle plays.

150B. English Drama from Marlowe to 1642 (4) II. Waddington
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 tragicomedies; post-Shakespearean development of dramatic action and blank verse.

150D. British Drama from 1850 to the Present (4) III. Mcguiness
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. The rise of dramatic realism; the chief reactions against it. Emphasis on Shaw, O’Casey, Osborne.

152. American Drama from Its Beginnings to the Present (4) II.
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 major works of early and modern periods. Miller, and others.

159B. The English Novel: 1700-1770 (4) II. Byrd
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: 1770-1850 (4) II. Dale
Lecture-discussion—3 hours; extensive writing (includes 6-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) III. Dale
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Ford, Henry, and others.

156D. The English Novel: 1900 to the Present (4) II. Craft
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 anti-modernist reaction.

156E. The Short Story (4)
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/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

156A. The American Novel to 1860 (4) I. 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.

156B. The American Novel from 1860 to the Present (4) II. 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) III. Sillia
Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1830 to the present) as a storytelling medium.

162. Film Theory and Criticism (4) II.
Lecture-discussion—3 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with a study of ten major works of international film art. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

171A. The Bible as Literature: The Old Testament (4) II. Robertson
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the historical Books, and the Wisdom Books. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, 4C, Philosophy 1, 108, Religious Studies 21, 40, or any course from the GE Literature Preparation List.

171B. The Bible as Literature: Prophets and New Testament (4) II. Robertson

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

NOTE: For key to footnote symbols, see page 133
representative novels and short stories which exemplify the major trends in this genre—time travel; alternative universes; utopian, anthropological, sociological science fiction.

175. American Literary Humor (4) I. Morris Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Enjoyable evenings with American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; mod- ernist poets and prose writers; black humor.

177. Study of an Individual Author (4) II, III. The Staff (Chairperson in charge) Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Survey of the works of an individ- ual author other than Chaucer, Shakespeare, or Mil- ton. May be repeated for credit when a different author is studied.

179. Multi-Ethnic Literature (4) III. Kramer Lecture-discussion—3 hours; papers. Prerequisite: course 1 or 3, or standing above freshman level. Fic- tion, poetry, and other writings by Americans of eth- nic minority background (Native, Black, Hispanic, Jewish, Italian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature.

180. Children’s Literature (4) I—
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, criticism and evaluation, illustration and bibliography.

181. Black Literature (4) I. Morris Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. A study of the writings of black Americans, including Cheery, Du Bois, and Dunbar in the late nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary black writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

182. Literature of California (4) I—
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. California literature in the context of California’s social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists, the Beats, and writers of the latter half of the century. In odd-numbered years: General Education credit: Civilization and Culture/ Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 1, 2, or 3.

184. Literature of the Wilderness (4) III. Snyder 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 odd-num- bered years. General Education credit: Civilization and Culture/ Non-Introductory. Recommended GE preparation: English 3, History 17A, or 17B.

185. Literature by Women (4) II—
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Enjoyable evenings with women from Bradstreet and Bath to the Brontes, Eliot, Woolf, Plath, and Rich. The effects of social constraints upon women’s art, the rise of feminism; new trends in literary criticism.

187. Literature and the Other Arts (4) III. Stange 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 literary works 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. Limited enrollment. May be repeated for credit with consent of instructor.

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. May be repeated for credit with consent of instructor.

192. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Field work assignments. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A maximum of 4 units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.

194H. Special Study for Honors Students (4) I. The Staff (Chairperson in charge) Seminar—3 hours; term paper. Prerequisite: admission to English Department Senior Honors Program. Study of a special literary topic or of the works of a major writer, and preparation for writing an honors thesis in course 195H.

195H. Honors Thesis (4) I. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: course 194H. Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the major in critical emphasis write a scholarly or critical subject; creative writing stu- dents submit a volume of poems or fiction.

197T. Tutoring in English (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department’s regular courses. Does not fulfill requirement for major. May be repeated for credit for a total of 8 units. (P/NP grading only.)

197TC. Community Tutoring in English (1-4) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-4 hours. Prerequisite: upper division standing and a major in English; consent of Chair- person. Field experience, with individuals or in a classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: Course from courses 1, 3, 5, 5P. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Techniques of Literary Scholarship (4) II. Waddington Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of selected modes of literary investiga- tion—critical, historical, textual, and others.

201. Literary Criticism (4) Torrance Discussion—3 hours; term paper. Survey of the major criticism from Aristotle to the present, with emphasis on relationship of critical theory to the history of literature.

203. Theory and Practice of Written Composition (4) Seminar—3 hours; practical exercise in writing and tutoring. Students admitted by application only. Course by examination of their own writing skills. Those with insufficient advanced command of writing shall be required to take a special section of course 103, at no credit, before enrolling in course 203.) Instruction in the teaching of composition. Emphasis on mastering both the basics and finer points of expository prose and on teaching such skills to others.

205. Introduction to Old English (4) I. Osborn Discussion—3 hours; written reports, individual con- ferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

207. Middle English (4) Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects, particular emphasis on the Old English literary and external linguistic history; intensive reading of texts.

209. Present-Day English Linguistics (4) Discussion—3 hours; term paper. Theory and meth- ods 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 lan- guage, literature, and composition.

210. Readings in English and American Litera- ture (4) 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 the ability of instructor. Course designed for students preparing for their compre- hensive examinations. May be repeated for credit.

215. Arthurian Romance (4) Seminar—3 hours; conference—1 hour. The sources of Arthurian Romantic literature. Continental and English literary treatment; Malory’s synthesis; signifi- cant changes of attitudes in post-Malory literature.

225. Topics in Irish Literature (4) I. Mcguinness Seminar—3 hours; conference—1 hour. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the fourteenth-centu- ry novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

230. Study of a Major Writer (4) III. Hays Seminar—3 hours; conferences with individual stu- dents—1 hour; research papers. Artistic develop- ment of one major writer and his intellectual and liter- ary milieu. May be repeated for credit when a differ- ent writer is studied.

232. Problems in English Literature (4) Seminar—3 hours; conferences with individual stu- dents—1 hour. Selected issues in the current study and critical assessment of reading course in English literature. May be repeated for credit when different period or topic is studied.

233. Problems in American Literature (4) I. Kramer, Robertson, III. Silver Seminar—3 hours; conferences with individual stu- dents—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) II. Cohn (Dramatic Art) Seminar—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and satire, and their modes of literary investiga- tion—critical, historical, textual, and others.

236. Theory of Fiction (4) III. Tallent 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.

238. Poetics (4) I. Major Seminar—3 hours; conference—1 hour. Structure, prosody, and idioms of British and American poetry approaches—sometimes through an inten- sive study of a single writer, sometimes historically or theoretically—at the instructor’s discretion. Prepara- tion and evaluation of research papers. Directed toward Creative Writing master’s degree students.

237. Modern Critical Theory (4) I. Hoffman Seminar—3 hours; conference—1 hour. Examination

NOTE: For key to footnote symbols, see page 133.
Major Adviser: C.Y.S. Peng.

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

**Entomology**  
18-19
- **Entomology 100, 100L**  
- At least two courses from Entomology 101, 102, 103, 104, 106  
- At least two additional upper division Entomology courses (except courses 192, 198, 199)  

**Agricultural Entomology**  
21  
- **Entomology 100, 100L, 110, 115, 135, 177**  
- **Entomology 120**  

**Agriculture**  
18  
- **Entomology 100, 100L, 119, 119L**  
- **Entomology 104 or 110**  
- **Entomology 210**  
- **Entomology 210, Botany 210, Pomology 202**  

**Insect Ecology**  
20  
- **Entomology 100, 101, 104, 107**  
- **Entomology 103, 105, 106, 109**  
- **Zoology 149 or Environmental Studies 121**  

**Medical-Veterinary Entomology**  
18  
- **Entomology 100, 104, 153, 156, 161**  
- **Zoology 105, 106, 107**  

**Evolution**  
15  
- **Genetics (Genetics 100)**  
- **Ecology (Environmental Studies 100 or Zoology 105)**  
- **Zoology 149 or Environmental Studies 121**  

**Upper division electives courses in science (exclusive of entomology), and related to students' interest**  

**University Course**  
5  
- **Genetics (Genetics 100)**  
- **Ecology (Environmental Studies 100 or Zoology 105)**  
- **Zoology 149 or Environmental Studies 121**  
- **Applied entomology, one course from Entomology 110, 115, 153**  
- **Upper division electives courses in entomology**  

**Breadth Subject Matter**  
37-43  
- **English (see College requirement)**  
- **Rhetoric (see College requirement)**  
- **Economics**  
- **Philosophy**  

- At least one course from the following categories:
  - Anthropology, political science, psychology, sociology  
  - *An or music*  
- Electives in social sciences and humanities  

- At least one course chosen from agronomic studies, geography, or geology  

- **Unrestricted Electives**  
20-34  
- **Total Units for the Major**  
180  

NOTE: For key to bothecide symbols, see page 133.
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of integrated pest management with emphasis on arthropod pests in California crop systems. Definition of pest status, management tactics, pest damage, and interactions between pests and plants. Integration of control tactics. Use of insecticides within the IPM framework.

116. Biology of Aquatic Insects (3-5) III. Grigarick.
Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes.

119. Apiculture (3) III. Gary
Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honey bees; husbandry and care, management, and use of colonies for agricultural, recreational, teaching, and research purposes.

120. Insect-Host Plant Interactions (4) II. Duffey.
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 101, 102, Biochemistry 101A-101B or the equivalent; general introductory course in botany and/or plant physiology will be helpful. Morphological, physiological, and biochemical bases of host-plant selection by insects; consideration of times and sites of host-plant resistance to insects. Emphasis on comparative defensive and biochemical interaction between various organisms, particularly plants and insects.

135. Introduction to Biological Control (4) III.
Ehler, Kaya.
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of biological control of arthropod pests and weeds. Biology of pathogens, entomopathogenic nematodes, parasitoids, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management.

147. Historical Biogeography and Evolution of Biodiversity (3) III. Kimsey.
Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 10 or Biological Sciences 10. Designed for non-majors. Explores the relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years.

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 with special emphasis on the entomological aspects of human diseases and principles of their control. General Education credit: Nature and Environment/Non-Introductory. Recommended preparation: Entomology 111 or any other course in the biological sciences.

156. Biology of Parasitism (3) III. Washino in charge, Thesi (Medical Microbiology), Maggenni (Nematology).
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructors. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan, nematode, and arthropod parasites.

156L. Biology of Parasitism Laboratory (1) III.
Washino in charge, Thesi (Medical Microbiology), Maggenni (Nematology).
Laboratory—3 hours. Prerequisite: course 156 (current) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and nematode nematode organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course.

192. Internship (1-12) I, II, III, extra session. The Staff (Chairperson in charge)
Laboratory or in field not to exceed 286 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 Entomology. Internship supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Entomology (1-3) I, II, III, McClelland.
Discussion—1 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, summer. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with an emphasis on theoretical fundamentals of aspects of natural selection, behavior, ecology, physiology, and biochemistry as related to the regulation of insect populations. Provides the theoretical framework for course 200B.

200B. Conceptual Basis of Entomology: Application (4) III. Washino, Duffey.
Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with emphasis on the application of theoretical/conceptual outlines from course 200A to epidemiology, biotechnology, biological control and integrated pest management for pursuing current insect pest problems concerning food, fiber, and health.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 102 or the equivalent or consent of instructor; Biochemistry 101A or 101B recommended. Selected topics in insect physiology. Intensive study of topics of current interest, which will vary from year to year. Course may be repeated for credit. Offered in odd-numbered years.

205. Insect Demography (3) III. Carey.
Lecture—3 hours; prerequisite: introductory ecology; calculus. Concepts and methods of mathematical demography as applied to insect populations; reasoning behind demographic calculations. Mechanisms of calculations stressed. (SU grading only.)

208. Pesticide Toxicology in Arthropods (3) II.
Lecture—2 hours; discussion—1 hour. Prerequisite: course 115 or Environmental Toxicology 101 (may be taken concurrently). Biochemistry 101B. Principles of toxicology including resistants of pesticides to selective, pharmacodynamics, sites of action and life tables. Emphasis on chemical and field aspects of insecticides and acaricides. Offered in odd-numbered years.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119L. Current topics in bee biology with special considerations of morphology, caste determinations, queen rearing, nutrition, physiology, pathology, and products of honey bees. Offered in even-numbered years.

Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. Field course conducted over spring break and four weekend visits to Bodega Bay emphasizing student projects.

NOTE: For key to footnote symbols, see page 133.

Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results stressed.

230. Advanced Biological Control (3) II. Ehler.
Lecture—2 hours; discussion—1 hour. Prerequisite: course 135. Advanced treatment of current topics in biological control of arthropod pests and weeds. Offered in odd-numbered years.

253. Advanced Medical Entomology (3) III.
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in epidemiology; 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 odd-numbered years.

290. Special Topics in Entomology (1-4) I, II, III.
The Staff (Chairperson in charge).
Seminar—1-4 hours. Prerequisite: consent of instructor.

291. Seminar in Medical Entomology (2) I. McClelland, Washino, Eldridge.
Seminar—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) II. Juddson, Duffey, Hammock, Masai.
Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest in insect physiology and biochemistry.

293. Seminar in Systematic Entomology (2) II.
Ward, Thorp, Kimsey.
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematics and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions.

294. Seminar in Insect Ecology (2) II. Carey, Ehler, Karban.
Seminar—2 hours. Prerequisite: a general ecology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches.

295. Seminar in Agricultural Entomology (2) II.
Grigarick, Granett, Leigh, Parmella, Wilson.
Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest and insect population management.

296. Seminar in Bee Biology (2) I. Thorp, Gary, Page, Peng.
Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of bees ecology, management, and general biology of bees (Apoidea) with emphasis on the honeybee.

297. Seminar in Insect Behavior (2) II. Gary, Dingle.
Seminar—2 hours. Prerequisite: a course in animal behavior. Review and critical analysis of contemporary advances in insect behavior, especially interpretation and description 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 Courses

403. Oral Presentation of Scientific Information (1) I. Granett, Duffey.
Laboratory—discussion—2 hours every other week. Prerequisite: graduate standing; Helps students in preparing information for (1) 8- to 10-minute talks at scientific meetings, (2) research seminars, (3) class lectures, and (4) impromptu talks.
Environmental and Resource Sciences

See Atmospheric Science; Range and Wildlands Science; Resource Sciences; Soil Science; Water Science; and Wildlife and Fisheries Biology

Faculty
See under the Division of Environmental Studies.

The Major Program
The Environmental Biology and Management major emphasizes a fundamental program of education in the 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 curriculum draws on a wide variety of scientific disciplines for its theoretical basis and analytical skills. Chemistry, physics, mathematics, biology, and earth sciences are studied and tied together by courses in ecology, computing, statistics, and other methods courses give the student basic quantitative research skills. Economics, political science, and techniques of environmental management offerings dominate the management and public policy requirements. The major prepares students to enter careers in management of natural resources and public lands, as well as basic ecological research. A moderate degree of specialization is permitted in two upper division options. Students in the Environmental Biology option take course work in population ecology, physiology, and other biological specialties, as well as quantitative analysis. These courses prepare them for graduate training and, eventually, careers working for public agencies and private firms specializing in environmental quality, natural resources, or ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, e.g., organic chemistry. 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 and is prepared for jobs primarily in public agencies at the federal, state, or local levels. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the Environmental Policy Analysis and Planning major.

B.S. Major Requirements
(The usual courses taken to satisfy requirements are shown in parentheses. Equal or more comprehensive courses may be taken with the adviser's written approval. Courses shown without parentheses are required.) Students are required to plan their course selection with their adviser.

UNITs
Written/Oral Expression
10-12
English (English 102 concurrently with Environmental Studies 1). Note: English requirement for major simultaneously satisfies College requirement.
Oral expression (Environmental Communication 1 or Dramatic Art 10)
Preparatory Subject Matter
4-37
Biological sciences (Biological Sciences A)
Chemistry courses
A 119 or B 119, 120
Computer Science (Agricultural Science and Management 21, Computer Science Engineering 10, or Engineering 10)
Ecology of biomes (Environmental Studies 30)
Environmental sciences (Biological Sciences 1B or Geology 1-11)
Environmental/policy analysis (Environmental Studies 1, Political Science 1, or Economics 1A; Economics 1B if Environmental Management option is selected)
Mathematics (Mathematics 16A or 21A-21B)
Physics (Physics 10, 10A-A)
Breadth/General Education
12-24
Satisfaction of General Education requirement to include 12 units of humanities and/or Civilization and Culture.
Depth Subject Matter
26-33
(These units must be taken for a letter grade attaining an overall grade-point average of 2.000 or higher.)
Ecology (Environmental Studies 100)
Survey of environmental science, Environmental Studies 110
Environmental sciences (Soil Science 100, 118, Resource Sciences 131, Atmospheric Science 120, Environmental Studies 150A, Geology 134, 153, 154, Water Science 100, 141)
Environmental Policymaking/Resource Economics (Environmental Studies 160, 161, or 165; Agricultural Economics 147, 176, or Economics 123)
Management of Public Lands, Environmental Studies 172
Statistics, Statistics 102 or Agricultural Science and Management 150
Research methods (Environmental Studies 123, 128, 178, Mathematics 222, upper division computing, mathematics, or statistics)
Areas of Specialization
31-44
Environmental Biology Option
Population and community ecology (Environmental Studies 121, Zoology 149, Wildlife and Fisheries Biology 122)
Behavioral ecology (Environmental Studies 125)
Evolution (Genetics 101, Zoology 148)
Quantitative analysis (Mathematics 22A-22B, upper division mathematics or statistics)
Taxonomy, including laboratory experience (Botany 102, 108, 116, Entomology 103, Wildlife and Fisheries Biology 110, 111, 112, 120, Zoology 112-121, 133-133f)
Physiology, including laboratory experience (Environmental Studies 129, 129A, 174, 175)
Biological systems, two courses from one of the following two groups
Aquatic biology: Environmental Studies 151, 151L, Water Science 112-114, 122, Environmental Studies 150B-150C, Wildlife and Fisheries Biology 120, 122, Terrestrial ecology: Wildlife and Fisheries Biology 100, Botany 101, 102, 117, 141, Geography 173
Environmental Management Option
Recreation, Environmental Biology and Management (Environmental Studies 162)
Microeconomics, Economics 100
Policy evaluation, Environmental Studies 106
Bureaucratic Policy Making, Environmental Studies 160, 166, or Political Science 182
Quantitative Research (Environmental Studies 166B, Agricultural Economics 155, 157, or Environmental Studies 166B)
Environmental Management; Environmental Studies 177 or 178, Environmental Engineering Planning, Civil Engineering 152, 160, or 175
Statistical Analysis, Sociology 106, Statistics 106, or Agricultural Economics 106
Management of a natural resource, two courses from one of the following three groups
Animal Resources: Range Science 135, or Wildlife and Fisheries Biology 111, 122, 151, or Resource Science 101, or Environmental Studies 123.
Forest and Rangeland Resources: Resource Science 2, or Range Science 135, 134, 145.
Air, Water, and Soil Resources: Resource Science 131, or Water Science 41, 103, 122, 141, or Geography 162, or Soil Science 118, or Environmental Studies 151L.

Unrestricted Electives
20-62
Total Units for the Degree
180
Major Adviser: T. M. Powell (Environmental Studies)
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, Human Development, and Applied Behavioral Sciences students wishing to work in extracurricular therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in public recreation policy analysis and management; and Managerial and 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.

Leisure behavior, Environmental Biology and Management 116 or 127............ 4
(Course 116 is prerequisite to Environmental Biology and Management 122 and 134)

Resource economics, Agricultural Economics 147, 176, Economics 123... 3-4

Urban Systems, Physical Education 160----------------------------- 3

Recreation planning and policy analysis, Environmental Biology and Management 134 or 147 or 162.----------------------------- 3

Recreation administration, Environmental Biology and Management 122............ 4

Internship, Environmental Biology and Management 192............ 4

Minor Adviser: R. A. Johnston (Environmental Studies).

Courses in Environmental Biology and Management

Questions pertaining to the following courses should be directed to the instructor of or to the Environmental Biology and Management advising office, 2132 Wickenburg Hall.

Lower Division Courses

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 (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

110. Urban and Regional Planning (4) I. Gold (Environmental Biology)
Lecture—3 hours; discussion—1 hour, one Saturday field trip.
Prerequisite: upper division standing. The history, nature, scope, and significance of outdoor recreation in America life, with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation, and the profession.

116. Outdoor Recreation (4) I. The Staff
Lecture—3 hours; discussion—1 hour. History, nature, scope, and significance of outdoor recreation in American life, with emphasis on user-resource relationships, special problems, policy issues, and innovation.

122. Park Administration (4) II. The Staff
Lecture—3 hours; discussion—1 hour; Saturday field trip. Prerequisite: course 116. Description and analysis of the nature, concepts, and techniques of providing leisure opportunities. Emphasis on the policies, programs, and organization of park and recreation systems.

127. Leisure Behavior (4) II. Loomis

134. Recreation Planning (4) III. Gold
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, principles, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

160A. Environmental Interpretation Principles (3) II. The Staff
Lecture—3 hours. Prerequisite: Rhetoric and Communication 1 or 3 and English 1 or 104 recommended. Application of communication theories and principles to environmental interpretation with emphasis on park and recreation interpretation, museums, historic areas, botanical and zoological gardens. Emphasis on reasoning to interpretive strategies from theory and principles.

160B. Environmental Interpretation Methods (3) III. The Staff
Lecture—1 hour; laboratory—3 hours; to be arranged—3 hours. Prerequisite: course 160A; English 104 recommended. Interpretation development and operations. Students learn to plan, produce, present, maintain, and evaluate interpretive programs. Includes instruction in the use of selected interpretive media.

192. Internship in Environmental Biology and Management (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: upper division or graduate standing, completion of upper division course work relevant to the internship topic and consent of instructor. Students apply theory and principles learned in classroom instruction to applied problems under supervision of both a faculty adviser and a professional sponsor. Students must consult with a faculty adviser before applying for an internship. (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: 3 units of upper division work in park administration; consent of instructor. (P/NP grading only.)

Graduate Courses

290. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. An interdisciplinary seminar on selected current topics related to environmental planning, leisure behavior and environmental quality.

299. Research (1-6) I, II, III. The Staff (Chairperson in charge)
Research—3-18 hours. (SU grading only.)

Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Victoria Z. Rivers, M.A.C.T., S.C.T., Chairperson of the Department
Department Office, 144 Walker Hall (916/752-6222)

Faculty

Richard Bertaux, B.Arch., M.S., Associate Professor
Frances Butler, M.A., Professor
Kerry J. Dawson, M.A., Associate Professor
Mark Francis, M.L.A., Professor
Dolph Geleti, M.A., Associate Professor
Patricia Harrison, M.Arch., Assistant Professor
Gyorgy Laky, M.A., Professor
E. Byrion McCully, B.S.A., Associate Adjunct Professor
Edward S. McNiel, M.L.A., Assistant Professor
Helge B. Olsen, Senior Lecturer, S.O.E.
Susan Palme, M.A., Lecturer
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor

Programs of Study: See the majors in Design and Landscape Architecture.

Related Courses: See Design and Landscape Architecture courses.

Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Roy M. Sachs, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (916/752-0130)

Faculty

Alison M. Berry, Ph.D., Assistant Professor
David W. Burger, Ph.D., Associate Professor
Thomas G. Byrne, M.S., Lecturer
Don J. Duran, Ph.D., Professor
Richard Y. Evans, Ph.D., Lecturer
Seymour M. Gold, Ph.D., Professor
James A. Harding, Ph.D., III, Professor
Richard W. Harris, Ph.D., Professor Emeritus
Charles E. Hess, Ph.D., Professor
Anton M. Krafkan, Ph.D., Professor Emeritus
Harry C. Kuhl, Jr., Ph.D., Professor Emeritus
Andrew T. Leiber, Ph.D., Professor Emeritus
J. Heinrich Lieb, Ph.D., Professor Emeritus
James D. MacDonal, Ph.D., Associate Professor
(Plant Pathology)

Don H. Madison, Jr., Ph.D., Professor Emeritus
Carolyn Napoli, Ph.D., Assistant Professor
Jack L. Paul, Ph.D., Professor
Michael S. Reid, Ph.D., Professor
Roy M. Sachs, Ph.D., Professor
Lin L. Wu, Ph.D., Associate Professor

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 Division section.

Related Courses. See Plant Science.

Courses in Environmental Horticulture

Lower Division Courses

6. Introduction to Environmental Plants (3) III, summer Harding.
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Classification, nomenclature, and identification of common trees, shrubs, ground covers, turf-grasses, bedding plants, and house plants. Characteristics of important plant families are discussed.

10. Landscape Horticulture for the Home and Community (3) III. 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.

62. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: lower division standing. Biological Sciences 1C or Plant Science 2 or 10, and consent of instructor. Work-learning 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/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Sachs in charge)
(P/NP grading only.)

Environmental Design

(College of Agricultural and Environmental Sciences)

Victoria Z. Rivers, M.A.C.T., S.C.T., Chairperson of the Department
Department Office, 144 Walker Hall (916-752-6222)

Faculty

Richard Bertaux, B.Arch., M.S., Associate Professor
Frances Butler, M.A., Professor
Kerry J. Dawson, M.A., Associate Professor
Mark Francis, M.L.A., Professor
Dolph Geleti, M.A., Associate Professor
Patricia Harrison, M.Arch., Assistant Professor
Gyorgy Laki, M.A., Professor
E. Byrion McCoy, B.S.A., Associate Adjunct Professor
Edward S. McNiel, M.L.A., Assistant Professor
Helge B. Olsen, Senior Lecturer, S.O.E.
Susan Palme, M.A., Lecturer
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor

NOTE: For key to footnote symbols, see page 133.
Environmental Planning and Management

Environmental Policy Analysis and Planning

(College of Agricultural and Environmental Sciences)

The Major Program

Environmental Policy Analysis and Planning seeks to develop an understanding of both techniques for evaluating, and the factors affecting, governmental policy-making in a variety of sectors and for a range of 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 development.

The major will be attractive to students who want the analytical skills and broad background in the social and natural sciences for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. It will also be appealing to professional students who want to go on to graduate work in law, planning, public policy, or management, and who need both a wide background in the social and natural sciences and a fairly extensive background in a policy area. It is anticipated, however, that most career-oriented graduates will eventually seek an advanced degree.

The course requirements are designed to provide both the basic substantive knowledge and analytical skills necessary for a quality program in environmental policy analysis and planning. Although certain courses are stipulated for all students involved in the program, the emphasis is on required units within categories of courses. This recognizes the wide variety of students' interests and the changing content and quality of specific courses from year to year. It is very important, however, that students develop a close relationship with their major advisor in order that the preparatory and depth courses selected be appropriate to each student's interests and desired area of specialization.

B.S. Major Requirements:
(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. Courses shown without parentheses are required.)

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<tr>
<th>UNITS</th>
<th>Written/Oral Expression</th>
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<tbody>
<tr>
<td>See College requirement</td>
<td>7-8</td>
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<tr>
<td>Additional English (English 102 concurrent with Environmental Studies 1)</td>
<td>5</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>51-58</td>
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<tr>
<td>Biological sciences (Biological Sciences 1A)</td>
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<td>Chemistry (Chemistry 1A, 1B)</td>
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<td>Computer science (Agricultural Science and Management 21, Engineering 5)</td>
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<td>Computer Science Engineering 10, 40</td>
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<tr>
<td>Economic principles (Economics 1A, 1B)</td>
<td>10</td>
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<td>Environmental science/agriculture (Animal Science 1, Biological Sciences 1B, Geography 1, Geology 1, Plant Science 10, Soil Science 100, Water Science 100, 104)</td>
<td>3-5</td>
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<tr>
<td>Environmental studies (Environmental Studies 1)</td>
<td>4-6</td>
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NOTE: For key to footnote symbols, see page 133.

Environmental Policy Analysis and Planning

Environmental Planning and Management

See Environmental Biology and Management
Environmental Studies

(Intercollege Division)

Charles R. Goldman, Ph.D., Chairperson of the Division
Division Office, 2132 Wilson Walk (910-752-5826)

Faculty
Theodore C. Folin, Ph.D., Professor
Charles R. Goldman, Ph.D., Professor
William J. Hamilton III, Ph.D., Professor
Alan M. Hastings, Ph.D., Professor
Robert A. Johnston, M.S., Associate Professor
John B. Loomis, Ph.D., Associate Professor
Robert S. Mabry, Ph.D., Associate Professor

Research Methods
Environmental Studies 177, 178, or Sociology 103

Sociology 106 or Agricultural Economics

Economics 100 or Statistics 106

Agricultural Economics 176

Areas of Specialization (choose one)

Advanced Policy Analysis Option
Political Institutions (Political Science 102, 105, 108, 155, Environmental Studies 162)

Political behavior (Political Science 164, 165, 170)

Science policy (Environmental Studies 160)

Policy evaluation research (Environmental Studies 168)

Policy evaluation (Civil Engineering 153, 160, Agricultural Economics 155, Economics 125, 130)

City and Regional Planning Option
Urban design (Art 168, Environmental Biology 110, Landscape Architecture 40 recommended)

Urban geography (Geography 155, 156)

Transportation planning (Civil Engineering 160)

Environmental impact assessment (Sociology 118, Environmental Studies 179)

Urban economics (Economics 125)

Urban politics (Political Science 102, 100)

(Enroll for 4 units if 173 for law requirement under Depth Subject Matter above.)

Energy Policy Option
Environmental health (Environmental Studies 160, 162, Environmental Toxicology 101)

Nuclear hazards (Environmental Studies 115)

Energy technology (Engineering 160, 162)

Solar energy (Resource Sciences 103)

Economics of energy (Environmental Studies 169)

Energy policy (Environmental Studies 167)

Environmental Science Option
Environmental health (Environmental Studies 162, Environmental Toxicology 101)

Soils and land use (Soil Science 116, Geology 134)

Aquatic systems (Environmental Studies 116, 151, Water Science 41, 103, 141, 180)

Meteorology and air pollution (Resource Sciences 131, Atmospheric Science 149A, Chemical Engineering 149)

Science policy (Environmental Studies 165)

Recreation Policy Option
Leisure behavior (Environmental Biology and Management)

Survey research (Environmental Studies 177)

Urban recreation (Physical Education 150, Environmental Biology and Management 143)

Policy analysis (Environmental Studies 162)

Recreation management (Environmental Biology and Management 122, Agricultural Economics 112)

Transportation Planning Option
Urban structure (Geography 155, 156, Economics 125)

Transportation planning (Civil Engineering 160)

Transportation engineering and analysis (Civil Engineering 161, Environmental Studies 168)

Energy policy (Environmental Studies 167, Engineering 160)

Air quality (Resource Sciences 131)

Energy and environmental aspects of transportation (Environmental Studies 163)

Water Quality Option
Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 162)

Water pollution (Water Science 41, Soil Science 120)

Freshwater systems (Water Science 122, Environmental Studies 151)

Field and laboratory methods (Water Science 123, Environmental Studies 151)

Water chemistry (Water Science 103, 160)

Hydrology (Water Science 141)

(Enroll for Water Science 150 for law requirement under Depth Subject Matter above.)

Unrestricted Electives

Total Units for the Degree

Major Adviser, S. J. 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 policy analysis. The Energy Policy minor requires the following courses:

- Energy policy (Environmental Studies 167)
- Energy technology (Engineering 160, 162)
- Solar energy (Resource Sciences 103)
- Economics of energy (Environmental Studies 169)
- Energy policy (Environmental Studies 167)

Energy Policy Option

Preparation: Economics 1A, 1B; basic course in political science

Resource Sciences 3 or Engineering 160

Environmental Studies 126 or Environmental Toxicology 101

Resource Sciences 103 or Environmental Studies 115

Environmental Studies 160

Environmental Studies 167 or Political Science 171

Environmental Policy Analysis

Preparation: Economics 1A, 1B; basic course in political science

Energy Policy 18-19

Preparation: Economics 1A, 1B; basic course in political science

Resource Sciences 103 or Engineering 160

Environmental Studies 126 or Environmental Toxicology 101

Resource Sciences 103 or Environmental Studies 115

Environmental Studies 169

Environmental Studies 167 or Political Science 171

UNITS

Environmental Policy Analysis 23-24

Preparation: Economics 1A, 1B; basic course in political science

Environmental Studies 110, 160, 161, 166, 168A

Environmental Studies 171 or 179

Minor Adviser, S. J. Schwartz (Environmental Studies)
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.
The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resource laws and conservation; quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not credit for those who have had course 1. General Education credit: Contemporary Societies/Introductory.

30. The Global Ecosystem (3) III. Richardson
Lecture—3 hours; Prerequisite: Biological Sciences 1A or Geography 1 or consent of instructor. Focuses upon the current climate and biotic adaptation produces ecological systems. It will then examine the limits and opportunities for human use of different natural systems. Not credit for those who have had course 1. General Education credit: Natural and Environmental Systems/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: lower division status and instructor consent. Work-learning 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.)

96. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

100. General Ecology (4). Quinn
Lecture—4 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus; Ecological principles of biological systems, emphasizing populations and communities, competition, 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). R. Richardson
Lecture—4 hours; discussion—1 hour. Prerequisite: 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 which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Environmental Studies 1, 30, Anthropology 1, 2, Biological Sciences 10, Geography 2, or Sociology 2.

(a) Environmental Science

110. Principles of Environmental Science (4). Powell
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 5A, Mathematics 16B or 21B, and Biological Sciences 1A. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.

115. Biophysical Consequences of Nuclear Technology (3) III. M. Goldman
Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology, biophysical impact of radio-nuclei and their effluents generated by nuclear technology. Hazards evaluation based on predictions of the most sensitive physiological response. Offered in odd-numbered years. (Same course as Radiological Sciences 115.)

116. The Oceans (4) II. Powell
Lecture—3 hours. Introductory survey of the marine environment; oceanic physical phenomena, chemical constituents, geological history, the sea's biota, and utilization of marine resources. (Same course as Geology 116.) General Education credit with concurrent enrollment in course 116G: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Chemistry 10, or Geology 1. 116G.

116G. The Oceans; Discussion (2) II. Powell
Discussion—2 hours. Prerequisite: course 116; Geology 116 concurrently. Scientific method applied to the discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. (Same course as Geology 116G.) General Education credit with concurrent enrollment in course 116; Nature and Environment/Non-Introductory. Recommended GE preparation: see course 116 above.

(b) Ecological Analysis

121. Population Ecology (4) I. H. Hastings
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. Development of mathematical and logical 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 and using tools to make predictions and solve problems. Offered in odd-numbered years.

123. Introduction to Field and Laboratory Methods in Ecology (4) III. Hamilton
Lecture—2 hours; laboratory—6 hours; two weekend field trips. Prerequisite: Statistics 13, course 100 (may be taken concurrently), or the equivalent. Course will introduce students to methods used in 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) Extracurricular
Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—19 hours (Summer Session II). Prerequisite: Biological Sciences 1A; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological problems with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

125. Social Systems of Animals and Humans (4) III. Hamilton
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) III. Beaumont
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Study of environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other environmental agents. Discussion of epidemiologic study designs, biases, and risk assessment.

127. Contemporary Problems in Environmental Health (3) I. III. Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: course 126 or consent of instructor. Contemporary problems and issues in environmentally dependent aspects of health. Diseases and injuries from environmental carcinogens, teratogens, pesticides, noise, radiation, consumer products, stress phenomena, and heavy metals are considered.

128. Analysis and Simulation of Complex Systems (3) I. Foin
Lecture—3 hours. Prerequisite: Mathematics 168 or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

129. Laboratory in Modeling Complex Systems (2) I. Foin
Laboratory—6 hours. Prerequisite: course 128 concurrently. Laboratory in model building. Students use software from course 128 to complete a number of exercises and small term projects. Simulation is in DYNAMO.

129. Physiological Ecology (4). I. Patterson
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 15, Physics 19, and Biological Sciences 1B or 1C. 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). I. Patterson
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) III. Rotow
Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 133.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

(d) Aquatic Ecosystems Analysis

156A. Physical and Chemical Oceanography (4) III. Powell
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 98, Mathematics 22C. Laboratory—6 hours; discussion 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. Offered in odd-numbered years. (Same course as Geology 159A.) Offered in odd-numbered years.

156B. Geophysical Oceanography (3) III. McClain (Geology)
Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust, marine volcanism, and deposition of marine sediments. Interpretation of geophysical history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.)

156C. Biological Oceanography (3) III. Powell
Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea, and plankton communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use of and impact on the ocean. Offered in even-numbered years. (Same course as Geology 150C.)

NOTE: For key to footnote symbols, see page 133.
151. Limnology (4) III. C. Goldman
Lecture—3 hours; discussion—1 hour; special project.
Prerequisites: Biological Sciences 10 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environmental.

151L. Limnology Laboratory (3) III. C. Goldman
Lecture—4 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.

(e) Environmental Policy Analysis

160. Environmental Decision Making (4) I. Sabatier
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1; Economics 1A; introduction to statistics; one course in environmental science. Alternative modes of environmental policy-making, and application to case studies of decision-making in the U.S. and California.

161. Environmental Law (4) II. Winstead-Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 100, 100A, Biological Sciences 1A, Environmental Toxicology 10, or Resource Sciences 100). English 1 and Political Science 1 recommended. Students in the Environmental Law School are introduced 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/Challenges/Intellectual Interdisciplinary. Recommended GE preparation: Political Science 1.

152. Recreation Policy Analysis (4) III. Loomis
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Agricultural Economics 147 or 176; Environmental Biology and Management 127. Introduction to major issues and evaluative techniques in the analysis of recreation policy. Principles of political science and economics are applied to the analysis of recreation demand and provision, and the resolution of conflicts between recreation and other uses.

153. Energy and Environmental Aspects of Transportation (3) III. Sperring
Lecture—3 hours. Prerequisite: Civil Engineering 160. Application of engineering, economic, and systems planning concepts. Analysis of energy, air quality, and other selected environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption. Emphasis on current political and policy constraints. Offered in even-numbered years. (Same course as Civil Engineering 163.)

154. Ethical Issues in Environmental Policy (3) III. Sabatier
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 150, 168A recommended. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policy-making.

155. Science, Experts and Public Policy (4) II. Craig
Lecture—4 hours. Prerequisite: upper division standing in science, one course in biology, course 160 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

156. Policy-Making in Natural Resource Agencies (4) II. Loomis
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1 or course 160. Analysis of factors affecting decision-making within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasizes critical examination of written materials. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

157. Energy Policy (4) III. Johnston
Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 160; course 100 or Political Science 101, 107, or 109. Overview of U.S. energy policy: policy analysis, philosophy and methods; major policy issues, such as renewable vs. nonrenewable; and applied study of regional, residential, and state policy options. Offered in odd-numbered years.

168A. Methods of Environmental Policy Evaluation (4) II. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13; Economics 100 (may be taken concurrently); Mathematics 168 or 218 and course 1 recommended. Evaluation of alternatives for solution of complex environmental impact analysis, benefit-cost analysis, distributional analysis, decision making under uncertainty, and multiobjective evaluation.

168B. Methods of Environmental Policy Analysis (4) III. Schwartz
Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for application of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project.

169. The Economics of Energy (4) II. Wilen
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100B or the equivalent. Introductory course in calculus recommended. Economic concepts necessary to study energy issues. Topics covered include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, substitutability. Offered in even-numbered years. (Same course as Agricultural Economics 169.)

(f) Environmental Planning

171. Environmental Planning (4) I. Johnston
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in political science and a course in environmental science. Laws, institutions, design and analysis methods, and means of implementation of plans for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

172. Public Lands Management (4) I. Loomis
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Introduction of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the future of public lands allocations.

173. Public Mechanisms for Controlling Land Use (4) I. Johnston
Lecture—4 hours. 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. Offered in odd-numbered years.

*177. Survey Research Methods (4) I. Loomis
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 102, 130, or Sociology 46B. Design, administration, response coding, and data analysis. Emphasis on survey design and use in recreation policy analysis.

178. Applied Research Methods (4) I. Sperring
Loomis
Lecture—4 hours. Prerequisite: Statistics 103 or Sociology 106. Research methods for analysis of urban and rural 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) III. Johnston
Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing; Biological Sciences 1A; one course from the following: course 10, 110, 110A, Environmental Toxicology 10, or Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing, review and management of impact reports in the context of rational democratic planning systems.

(g) Other Courses

190. Workshops on Environmental Problems (1-6) I, II, The Staff
Laboratory—2 to 16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrative view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Department Chair person in charge)
Laboratory—3 to 36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience training and on-campus or rural subject area off-assignment in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

212A. Environmental Policy Analysis (4) II. Sabatier
Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: course in public policy (e.g. Political Science 107 or 108), course in bureaucratic policy (e.g. course 166 or Political Science 181) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in odd-numbered 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 of public policy. Prerequisites: 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 odd-numbered years. (Same course as Ecology 212B.)

213. Alternative Transportation Energy (3) II. Sperring
Lecture—2 hours; discussion—1 hour. Prerequisite: course 163; course 167 or Agricultural Engineering 216 or the equivalent. Economics, environmental impacts, technologies and policies of non-petroleum transportation energy. Experiences in U.S., Brazil, New Zealand, and elsewhere. Energy options include alcohol, natural gas, hydrogen, battery vehicles, electric roadways, and fuel cells. Offered in even-numbered years.

229. Advanced Simulation Modeling (3) III. Foil
Lecture—2 hours; discussion—1 hour. Prerequisite: course 128-128L; Statistics 108 or Agricultural Economics 106. Advanced techniques in simulation modeling, optimization and simulation, dynamic parameter estimation, linear models, error-prop.
Environmental Toxicology

(College of Agricultural and Environmental Sciences)
Takayuki Shibamoto, Ph.D., Chairperson of the Department
Department Office, 4138 Meyer Hall (916-752-1142)

Faculty
Richard G. Burau, Ph.D., Professor (Environmental Toxicology, Soil Science)
Donald G. Crosby, Ph.D., Professor
Bruce D. Hammond, Ph.D., Professor (Environmental Toxicology, Entomology)
1. Audrey E. Wohley, Ph.D., Professor
Theodore L. Hufnagel, Ph.D., Professor
Wendell W. Kilgore, Ph.D., Professor
Marion G. Miller, Ph.D., Assistant Professor
Ming Qu, I, Ph.D., Professor
Fumio Matsunuma, Ph.D., Professor
Robert H. Rice, Ph.D., Associate Professor
James N. Selber, Ph.D., Professor
Takeyuki Shibamoto, Ph.D., Professor
Beverly C. Wilson, Ph.D., Professor (Environmental Toxicology, Avian Sciences)
Way W. Winterlin, M.S., Lecturer
Dorothy E. Wohley, Ph.D., Professor (Environmental Toxicology, Animal Physiology)

The Major Program

Environmental Toxicology deals with the properties, fate, behavior, biological effects, detection, and regulation of natural and man-made toxicants present in the environment. Toxicants studied in the major include pesticides, pollutants, industrial chemicals, and poisons produced by microbes, plants, and animals. The objective of the major is to provide training which will enable students to apply the principles and methodology of the physical and biological sciences to the study of toxicants as a basis for solving problems occasioned by the presence of toxicants in the environment. Through the appropriate choice of electives, students have the opportunity to specialize in any one of several areas of environmental toxicology. Students electing to emphasize the application of the physical sciences to the study of toxicants would qualify for positions in chemical analysis, environmental monitoring, and forensic toxicology. Those electing to emphasize the application of the biological sciences would qualify for positions in animal toxicology, environmental health and safety, and pest control. The major can also serve as preparation for graduate or professional school.

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.)

NOTE: For key to footnote symbols, see page 133.

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Science. Internships supervised by a member of the faculty. (P/N grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only)

Upper Division Courses
101. Principles of Environmental Toxicology (3) I. Matsunuma (Chairperson in charge) Lecture—3 hours. Prerequisite: Chemistry 8B, 128B, or the equivalent; Biochemistry 101A 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) I. Crosby, Selber Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformations; action of environmental forces which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

112B. Toxicants in the Environment (4) I. Burau, Shibamoto 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, measuring, and assessing 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: Biochemistry 101B (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: fate and mechanism-of-action of representative toxins, types of effects, symptoms, and antidotes.

114B. Biological Effects of Toxicants: Comparative Aspects (4) II. Kilgore, Miller Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 114A and consent of instructor. Course designed to demonstrate biological principles of toxics 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.

128. Food Toxicology (3) II. Shibamoto, Gruenwedel (Food Science and Technology) Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B, Chemistry and Biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.)

130-A. Selected Topics in Environmental Toxicology (3) I, II, III. The Staff (Chairperson in charge) Lecture—discussion—3 hours. Prerequisite: consent of instructor; courses 114A, 114B, 112A, 112B, 112, 130-A, and 130-E selected topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize such areas as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and the safe handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (3) II. Hsieh, Last (Internal Medicine) Lecture—3 hours. Prerequisite: Chemistry 8B (may
be taken concurrently) or the equivalent; Biochemistry 101A recommended. Toxicology of air pollutants in the ambient and occupational environments. Environmental fate, biochemical effects, quality criteria and standards, and pulmonary responses to these pollutants. Offered in even-numbered years.

132. Chromatography for Analytical Toxicology (4) I, II. Taught in charge
Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 88 or the equivalent (may be taken concurrently). Instructor: Application and theory of basic chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology; residue analysis comprises one-third of course.

138. Legal Aspects of Environmental Toxicology (3) II. 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 (1) I. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Seminar conducted by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology; Reports and discussion concerning oral and written literature, literature sources, and career opportunities. (P.N.P. grading only.)

190C. Research Group Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P.N.P. grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning 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.N.P. grading only.)

197T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching Toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P.N.P. grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P.N.P. grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P.N.P. grading only.)

Graduate Courses

203. Environmental Toxics (4) I. Crosby Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 88 and consent of instructor. Toxic chemicals: selection criteria topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Offered in even-numbered years.

214. Mechanisms of Toxic Action (3) III. Hammock Miller Lecture—3 hours. Prerequisite: Biochemistry 101A-101B or consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

220. Analysis of Toxicants (3) I. Seiber Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

220L. Analysis of Toxicants Laboratory (2) I. Seiber Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3) I. Shibamoto Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 218B 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. Offered odd-numbered years.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woolley Lecture—2/12 hours; discussion—1/2 hour. Prerequisite: Physiology 110 (or the equivalent) and basic understanding of neurophysiology; consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides, and hallucinogens. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. Offered in odd-numbered years. (Same course as Physiology 234.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Current topics in environmental toxicology. (S.U. grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge) Lecture-discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S.U. grading only.)

297T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored. Prerequisite: graduate standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching Toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (S.U. grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (S.U. grading only.)

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

Epidemiology and Preventive Medicine

Epidemiology and Preventive Medicine (School of Veterinary Medicine)

Richard H. McCapes, D.V.M., Chairperson of the Department
Department Office, 112 Surge IV
(818) 792-1275 Ext. 1714

Faculty

Raymond A. Bankowski, D.V.M., Ph.D., Professor Emeritus
JoAnne Bookman, M.S., L.S., Lecturer
Robert R. Bushnell, D.V.M., Lecturer
Tim E. Carnegie, D.V.M., D.O., Associate Professor
James T. Case, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Medicine

Thomae B. Farver, Ph.D., Professor
Charles E. Frant, Ph.D., Professor

Ian A. Gardner, B.V.Sc., Ph.D., Assistant Professor
2.3 Constantin Genigeorgis, D.V.M., Ph.D., Professor
John S. Grogan, D.V.M., Ph.D., Lecturer
Lynette A. Hart, M.A., Ph.D., Assistant Adjunct Professor
David W. Hird, D.V.M., Ph.D., Associate Professor
Jack A. Howarth, D.V.M., Ph.D., Professor Emeritus
David A. Jessup, D.V.M., M.P.V.M., Lecturer
Carolyn S. Kopp, M.L.S., Lecturer
Kenneth M. Lam, Ph.D., Associate Professor
Richard H. McCapes, D.V.M., Senior Lecturer
Duncan McMartin, D.V.M., Ph.D., Lecturer
Margaret E. Meyer, Ph.D., Professor Emeritus
Ben B. Norman, D.V.M., Ph.D., Lecturer
Hans P. Reimann, D.V.M., Ph.D., Professor
Walter W. Sadler, D.V.M., M.P.H., Professor Emeritus
Calvin W. Schwalbe, D.V.M., M.P.H., Sc.d., Professor
Patterson L. Smith, D.V.M., M.P.V.M., Lecturer
Frederick Stevens, D.V.M., M.S., Lecturer
George E. West, D.V.M., M.P.V.M., Lecturer
George R. Yamamoto, Ph.D., Professor
George K. York, Ph.D., Lecturer

Part-Time Clinical Faculty

Galestan Ghazikhani, D.V.M., Ph.D., Associate Clinical Professor

Courses in Epidemiology and Preventive Medicine

Upper Division Courses

104. History of Veterinary Medicine (3) III. Schwable Lecture—2 hours; discussion—1 hour. Veterinary medicine's role (from man's first domestication of animals to the decline of Rome) in building a foundation for rational healing; and its contributions during the eighteenth-twentieth centuries to the creation of modern medicine.

106. Human-Animal Interactions: Benefits and Issues (2) I. Hart Lecture—2 hours. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health, and therapeutic perspectives, as well as effects of humans on animals. Offered in even-numbered years.

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 agriculture and in public health, with emphasis upon animal management factors in disease.

150. Food-borne Infections and Intoxications (4) II. Genigeorgis, York Lecture—4 hours. Prerequisite: Microbiology 2. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P.N.P. grading only.)

Graduate Courses

202. Sampling in Health-Related Research (3) I. Farver Lecture—3 hours; laboratory—2 hours. Prerequisite: course 403 or the equivalent; consent of instructor. Three primary types of simple random sampling, stratified sampling, cluster sampling, and systematic sampling. Emphasis is on applied sampling techniques, but includes measurement and survey execution. Offered in even-numbered years.

203. Selected Topics in Medical Statistics (3) I. Farver Lecture—2 hours; laboratory—2 hours. Prerequisite: course 403 or the equivalent; consent of instructor. Selected topics in medical statistics related to the design and data analysis used in epidemiological research. Possible topics (chosen to suit interests and needs of each class) include: regression analy-
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sis; cross-categorical techniques, lifetables; surviv-
shion functions. Offered in odd-numbered years.

212. Epidemiology of the Zoonoses (3) II. Lecture—2 hours. Lecture—2 hours. Prerequisite: course 405 or consent of instructor. Biological and ecological features of infections shared by man and other animals with particular attention to those per-
spread in domestic and wild species and the issues of greater public health and economic significance.

216. Immunodiagnostic Techniques (3) II. Yamamoto, Lam Lecture—3 hours. Prerequisite: enrollment in MPVM degree program or consent of instructor. Considera-
tion of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple, and inexpensive procedures for mass screening.

216L Immunodiagnostic Techniques Laboratory (3) II. Yamamoto, Lam Discussion—1 hour; laboratory—2 hours. Prerequisite: course 216 (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal dis-
ees. (SU grading only.) Limited enrollment.

217. Evaluation of Screening Tests (1) III. Yamamoto, Lam Discussion—2 hours (alternate weeks). Prerequisite: consent of instructor. Evaluation of screening tests (biochemical, serological, or hematological) in the control of the population in which they are per-
formed to demonstrate how changes in various pop-
ulation parameters will influence test efficiency. Offered in odd-numbered years.

219. Mycoplasma as Agents of Disease (2) III. Yamamoto, Lam Lecture—2 hours. Prerequisite: Veterinary Microbiol-
y and Immunology 127 or the equivalent or con-
sent of instructor. Offered in even-numbered years.

220. Advanced Avian Medicine (3) III. Yamamoto, Lam Lecture—3 hours. Instruction on the methods of pre-
vention of the major diseases of domestic poultry.

220. Epidemiological Modeling (II) III. Carpenter, Lam Lecture—1 hour; discussion—2 hours. Prerequisite: courses 403 and 406 (may be taken concurrently). Techniques of model-building and simulation of infectious diseases will be explored. Epidemiological modeling philosophy, construction, and validation will be emphasized.

225. Preventive Avian Medical Practice (3) III. 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 prevention and eradication programs pertaining to diseases of economic importance are covered.

240. Veterinary Medicine and Human Health (3) III. Schwabe Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or con-
sent of instructor. Fulfillment of veterinary medicine's historic and newer roles as a human health profes-
sion; emphasis on zoonoses prevention, compara-
tive medical research, monitoring environmental haz-
ards, and ongoing efforts to promote humane values and mental health.

242. International Veterinary Medicine: The World Food/Population Problem (3) III. Schwabe Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or con-
sent of instructor. Survey of the world food-popula-
tion problem, emphasizing effects of animal dis-
eses and their control upon production of foods of animal and plant origin; comparisons of important third world and other situations; discussion of cur-
rent and future prospects.

254. Public Health Aspects of Meat and Meat Products Technology (3) III. Geniegeois Lecture—3 hours. Prerequisite: 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) II. Carpenter Lecture—2 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.

260. Current Topics In Avian Medicine (1) I, II, III. Lam, Yamamoto Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and inter-
pretation.

271. Seminars in Epidemiology (1) III. II. Iliff, I, III. The Staff (Chairperson in charge) Discussion—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. (SU grading only.)

288. Growth Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Growth studies in domestic animals will be dis-
cussed. (SU 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. (SU grading only.)

401. Biomedical Information Resources and Retrieval (3) Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Use of bib-
liographic tools for retrieval of biomedical literature; sources of epidemiological and statistical data; com-
puterized retrieval of information; preparation of bib-
ilographies.

402. Medical Statistics I (3) I. Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 402 or Statistics 13 (or the equivalent); consent of instructor. Use of statistics in clinical, labora-
tory, and population medicine; graphical and tabular presenta-
tions, probability, binomial distribution, Poisson dis-
tribution, chi-square distribution, elementary nonparametric methods; introductory methods in regression and correlation; lifetables.

403. Medical Statistics II (3) Lecture—2 hours; laboratory—2 hours. Prerequisite: course 402 or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sci-
cences; nonparametric methods; problems in sam-
ping and surveys; time dependent variation and trends; biomedical applications of statistical methods.

404. Medical Statistics III (3) III. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 403 or consent of instructor. Continuation of course 403. Multiple regression; discriminant analy-
sis; analysis of covariance; analysis of multivar-
ry frequency tables; biomedical applications.

405. Principles of Epidemiology (5) I. Hird Lecture—2 hours; laboratory—2 hours. Prerequisite: course 404 or the equiv-
alent; a degree in veterinary medicine, medicine or dentistry, or consent of instructor; combination of lectures, class discussions, and problem solving. Topics are methods of investigating disease out-
breaks, quantitating disease in populations, medical e-
cology surveys, an introduction to epidemi-
ology study design and disease surveillance.

406. Epidemiologic Study Design (3) III. Hird Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 403 (may be taken con-
currently) and 405, or consent of instructor; Design and Interpretation of cross-sectional, case-control,

and cohort studies (including controlled clinical tri-

407. Analytical Epidemiology (3) III. Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 406 and 404 (may be taken concurrently); use of multiple regression, discriminant analysis, factor analysis, path analysis and other multivariate techniques in epidemiology. Approaches for han-
dling the analysis of large data sets.

408. Research Methodology and Research Reporting (3) I. Lecture—1 hour; discussion—2 hours. Prerequisite: enrolled in MPVM degree program or consent of instructor; Application of the experimental method to formulation of epidemiological field problems involving disease of animals. Students must identify and select a problem, and complete all work preparatory to the actual field collection of data or specimens.

409A-409B. Topics in Data Analysis (2-3) II-III. The Staff (Chairperson in charge) Discussion—2 hours (409A); discussion—3 hours (409B). Prerequisite: course 406 (may be taken con-
currently) or consent of instructor. Emphasis on decision making with respect to the type and amount of data required for solving epidemiological problems and the selection and use of appropriate data in statistical and economic for presentation, analy-
zing, and interpreting these data. (Deferred grading only, pending completion of course.)

410A-410B. Topics in Applied Epidemiology (3) II-III. The Staff (Chairperson in charge) Discussion—3 hours (410A); discussion—2 hours (410B). Prerequisite: course 406 (may be taken con-
currently) or consent of instructor. Collection of data and/or specimens from field studies, serum banks or data banks. Laboratory examination of specimens and recording of results. Alternative approaches to presentation of data and conclusions and formulations of epidemiological investigations. (Deferred grading only, pending completion of course.)

411. Disease Control and Eradication (3) III. Iliff, I, III. Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 222 (may be taken concurrently), 255, 405. Studies of various approaches to control or eradicate disease in animal populations. Design and economic analysis of control programs.

412A. Use of Microcomputers: Level 1 (3) I. Stevens Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Introduction to and develop-
ment of skills on modern microcomputers for stu-
dents involved in epidemiological studies and research. Level one topics include microcomputer anatomy, operating systems, file handling, fundamental of word processing, spreadsheet, and sta-
tistical analysis software.

412B. Use of Microcomputers: Level 2 (3) II. Stevens Lecture—2 hours; laboratory—3 hours. Prerequisite: course 412A or consent of instructor. Development of intermediate skills on modern microcomputers for students involved in epidemiological studies and research. Level two topics include advanced use of word processing and spreadsheet software, and introduction to database management programs.

412C. Use of Microcomputers: Level 3 (3) III. Stevens Lecture—1 hour; laboratory—4 hours. Prerequisite: course 412B or consent of instructor. Development of advanced skills on modern microcomputers for students involved in epidemiological studies and research. Level three topics include advanced use of database management programs, and development of application programs to facilitate the students' research efforts.

NOTE: For key to footnote symbols, see page 133.
Fermentation Science

(The College of Agricultural and Environmental Sciences)

The Major Program

The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations such as those used in the production of microbial cells, drugs, enzymes, solvents, acids, and vitamins, in the expansion of the food supply, and preservation of the environment, are further opportunities for study. Courses are selected in consultation with advisors. Graduates qualify for supervisory, technical, research, sales, and executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies. The major can provide preparation for graduate study in food science, microbiology, agricultural and environmental chemistry or biochemistry.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

Written/oral expression ........................................ 7-8
See college requirement ........................................ 7-8

Preparatory Subject Matter .................................... 59-68

Biochemistry (Biochemistry 101A, 101B) ...................... 6
Biology (Biological Sciences 1A) ............................... 5
Chemistry (Chemistry 1A-18C, 5, and 8A, 8B, or 4A-4B-4C and 128A-128B, 128C) .............................. 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) ........ 6-8
Microbiology (Microbiology 102-102L) ........................................ 6
Physics (Physics 6A, 6B) .............................................. 8
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 course work in social sciences and humanities or others as approved by advisor to total 24 units.

Depth Subject Matter ............................................... 40

Choose from:

Chemistry 107A, 107B, 130

Chemical Engineering 161, 206

Epidemiology and Preventive Medicine 150 (or Food Science and Technology 104)

Food Science and Technology 102, 102L, 104, 104L, 108, 109, 110A, 110B, 150, 150L, 205, 235, 250, 250L

Genetics 100

Microbiology 105, 130A, 130B, 130L

Viticulture and Enology 3, 123, 124, 125, 126, 127, 136, 140, 186, 217, 219

(No variable unit 190, 192, 199, 299 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 ............................................. 28

Selected according to student's educational goals and upon approval by advisor.

Only 6 units of 192 or 6 units of 190, 199, or 298 may be counted: or a total of 6 units of these courses combined.

Unrestricted Electives ........................................... 14-22

Total Units for the Degree ..................................... 180

Major Advisor: R. E. Kunkie (Viticulture and Enology)

Graduate Study: Refer to the Graduate Division degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, Microbiology.

Fiber and Polymer Science

(The College of Agricultural and Environmental Sciences)

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. All students in this major are required to take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, the student is expected to select from courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles. The major prepares the student for a career in fiber or polymer science and related areas including research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). Graduates are prepared to enter the graduate program In Textiles or Agricultural and Environmental Chemistry with a specialization in Fiber and Polymer Chemistry, and textile science or fiber and polymer 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

Written and Oral Expression .................................... 11
See college requirement ........................................ 8

Additional English (English 104) ............................. 3
Preparatory Subject Matter ..................................... 55-58

Chemistry (Chemistry 1A, 1B, 1C, 5) ......................... 19
Computer science (Computer Science Engineering 10) .... 10
Mathematics (Mathematics 16A-16B, 16C, or 21A, 21B, 21C) .................................................. 9-12
Physics (Physics 3A, 5A, 5B, 5C or 9A, 9B, 9C) ............. 12
Statistics (Statistics 13 or Agricultural Science and Management 150) ............................................ 4

Textiles and clothing (Textiles and Clothing 6 and 8, or Engineering 45) ........................................... 8

Food Biochemistry

(The 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 storage and on processing. Particular emphasis is placed on the role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods. Through the appropriate choice of both electives and in-depth courses in food science and technology, the major offers broad education to students planning careers in food processing, food research, and other food-related fields.
The major also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and in the life sciences.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses; equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Written/Oral Expression 7-8
See College English requirement 7-8

Preparatory Subject Matter 73-81
Biochemistry (Biochemistry 101A, 101B) 6
Biological Sciences 1A 5
Chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C, 129A-129B-129C, 129A, 1297A-1297B or 110A-110B) 32-36
Mathematics, (Mathematics 16A-16B-16C or 21A-21B-21C) 9-12
Microbiology (Microbiology 102, 102L) 6
Physics (Physics 6A-6B-6C or 6A-6B-6C) 12

Other (one course from Computer Science Engineering 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, Statistics 13, Agricultural Science and Management 150) 3-4

Breath/General Education 24
Satisfaction of General English requirement 24

Depth Subject Matter 39-49
Food Science and Technology (to include Food Science and Technology 103, 104, 104L, 110A or 111, 112, 113) 25
Biochemistry (Biochemistry 123, 123L) 5

Restricted Electives 24
At least one upper division biochemistry course, other than Biochemistry 101A, 101B, 101L. One nutrition course other than Nutrition 10. Remaining courses can be selected from biochemistry, physiology, environmental toxicology, genetics, public health, microbiology or other subjects related to Food Science 24

Unrestricted Electives 13-22
Total Units for the Degree 180

Major Adviser: G. M. Smith (Food Science and Technology)
Graduate Study: Refer to the Graduate Division section in this catalog.

Food Science (A Graduate Group)

Norman F. Haard, Ph.D., Chairperson of the Group
Office, 1480 Chemistry Annex (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 -- under Plan I (thesis) and Plan II (comprehensive oral examination) -- and to the Ph.D. degree. Areas of emphasis include Chemistry-Biochemistry, Engineering-Technology, Enology, Microbiology, and Sensory Sciences in the M.S. program and Biochemistry, Chemistry, and Microbiology in the Ph.D. program. Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the Graduate Announcement.

Graduate Advisers. Contact the Graduate Division for the list of advisers.
104. Food Microbiology (3) I. Barrett
Lecture—3 hours. Prerequisite: Microbiology 2, Biochemistry 101A. Microorganisms in food safety, spoilage, and foodborne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource in foods. (Environment.)

104L. Food Microbiology Laboratory (3) III. C. Price
Lecture—1 hour; laboratory—6 hours. Prerequisite: Microbiology 2 and 3; course 104. Cultural and morphological characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.

107. Principles of Sensory Analysis of Foods (4)
II. Pampea in charge
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 6B and Microbiology 2, or permission of instructor. Topics relating to sanitary control of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the pertinence of government control agencies.

109. Principles of Quality Assurance in Food Processing (3) III. Merson in charge
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 emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry.

110A. Physical Principles in Food Processing (3)
II. Merson
Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A or 5C or the equivalent; calculus recommended. Not open to 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)
I. McCune
Lecture—3 hours. Prerequisite: course 110A or the equivalent; Agricultural Engineering Technology 110A recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, pyrolysis; mass transfer during drying, and storage.

111. Introduction to Food Processing (4)
II. Miller, Singh
Lecture—3 hours; discussion—2 hours. Prerequisite: course 102, 103, Chemistry 5, Laboratory experience in the use and application of standard brewing methods of analysis. Data collection on raw materials and application of these data in pilot- scale matting and brewing exercises. Processing studies and influence of process variables on product attributes.

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. Critical 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.

NOTE: For key to footnote symbols, see page 133.
cal considerations of thermal processes by canning, pasteurization, and aseptic processing. Process calculations of microbial sterilization and chemical changes to safeguard public health, nutrition, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

150L. Thermal Processing Laboratory (2) (L. Mer- shon) Laboratory—6 hours. Prerequisite: courses 104 and 110B; course 150 (may be taken concurrently). Laboratory exercises and student participation in the use and setup of modern processing methods and procedures and related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal processing equipment, and the development of process control procedures.

151. Freezing Preservation of Food (3) (L. Reid) Lecture—3 hours. Prerequisite: course 110B; Microbiology 2, 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 odd-numbered years.

156. Computer Interfacing for Laboratory and Process Control (4) (L. Russell) Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Principals of micro- and minicomputer control and measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

157. Food Process Design (2) (L. McCarthy) Lecture—2 hours. Prerequisite: course 110B; Integration of engineering and economic principles applied to food process design. Specific areas covered include equipment considerations, product quality, pollution control, equipment selection and safety. Offered in even-numbered years.

190. Senior Seminar (1) (L. Reid, 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) (L. III, III. The Staff (Merson in charge) Laboratory—36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.)

198. Directed Group Study (1-5) (I, II, III. The Staff (Merson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) (I, II, III. The Staff (Merson in charge) (P/NP grading only.)

Graduate Courses


202. Chemical and Physical Changes in Food (3) (L. Reid, Haard) Lecture—3 hours. Prerequisite: Biochemistry 101B; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds including storage, heating, freezing, dehydration, and concentrating of food materials.

205. Industrial Microbiology (3) (I. Ogrydziak) Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B and Microbiology 2, Microbiology 150A, 130B or Genetics 102 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Offered in even-numbered years.

207. Advanced Sensory-Instrumental Analyses (3) (W. Pangborn, and Ecolgy) Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of food products. Sensory and instrumental methods by which the relationships between substance and perceived quality are determined. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Offered in even-numbered years.


211. Lipids: Chemistry and Nutrition (3) (I. German Lecture—3 hours. Prerequisite: Biochemistry 101B, 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 utilization of lipids. Implications of dietary fats and health.

235. Mycology of Food and Food Products (3) (L. 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: pre-harvest and postharvest deterioration, food spoilage and preservation, toxin production.

250. Chromatographic and Electrophoretic Methods (4) (L. G. Smith, Bandman, German Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1A-B-1C, 8A-BB, 107A-107B; Biochemistry 101A-101B 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) (L. G. Smith, Bandman, German Laboratory—3 hours. Prerequisite: course 250 concurrently. Principles 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) (L. Russell Lecture—1 hour; laboratory—6 hours. Prerequisite: course 156 or the equivalent. Theory and practice of microcomputer interfacing to laboratory instrumentation for analytical and process control applications. Study of methods common to modern instrumentation and control systems including: A/D and D/A conversion, data transmission, signal conditioning, and computer interfacing.

260. Seminar (1) (I, II, Lewis Seminar—1 hour. (SU grading only.)

260C. Advanced Research Conference (1) (I, II, III. The Staff (Merson in charge) Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Preparation of research programs and proposals. Discussion led by individual major instructors for their research groups. (SU grading only.)

291. Advanced Food Science Seminar (1) (L. Lewis Seminar—1 hour. Prerequisite: completion of at least one quarter of course 290. Oral presentation of student's original research, discussion, and critical evaluation. (SU grading only.)

298. Group Study (1-12) (L. III, III. The Staff (Merson in charge) Prerequisite: graduate standing. (SU grading only.)

NOTE: For key to footnote symbols see page 133.
French
(College of Letters and Science)
Manfred Kusch, Ph.D., Chairperson of the Department
Department Office (French and Italian), 516 Sproul Hall (510-727-0830)

Faculty
Claude Abraham, Ph.D., Professor
Emily Apper, Ph.D., Associate Professor
Max Bach, Ph.D., Professor Emeritus
Marc Bois, Agnès de lettres, Professor
Euan M. Bloomberg, Ph.D., Associate Professor
Ruby Cohn, Ph.D., Professor [Comparative Literature, Dramatic Art]
Michael Harman, Ph.D., Assistant Professor (French, Comparative Literature)
Gerald Herman, Ph.D., Senior Lecturer
Margo R. Kaufman, M.A., Senior Lecturer
Marshall Lindsay, Ph.D., Associate Professor (French, Comparative Literature)
Marshall Lindsay, Ph.D., Professor Emeritus
Maria I. Manes-Mancini, Ph.D., Professor
Michèle Prager, Ph.D., Assistant Professor
Ruth B. York, Ph.D., Senior Lecturer Emerita

A. B. Major Requirements:

Preparatory Subject Matter: 19-36

French 1, 2, 3, 4 (or the equivalent): 0-17
French 21, 22, 23: 15
Linguistics 1: 4
French 45 recommended.

Depth Subject Matter: 44

French 100: 8
French 101, 102, 103: 12
French 104: 4
Two additional upper division French literature courses: 8
Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate advisor: 16
Total Units for the Major: 80-90

Recommended:
French 101, 102, 103, 104, 107, 135, and 160 plus other upper division courses for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

Major Advisor: G. Herman.

Minor Program Requirements:

French: 24

French 100, 101, 102, 103: 12
Two elective courses in French language, literature, or civilization to be chosen in consultation with undergraduate advisor: 6

Prerequisite Credit. Credit will not normally be given for a course in a minor or major successfully completed. Exceptions can be made by the Department Chairperson only.

Honors Program. Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honorary candidates must enroll in at least six units of French 194H distributed over two quarters. Normally, a student will undertake the honors project in the first two quarters of the senior year. Other arrangements must be authorized by the departmental chair. Only students who, at the end of the junior year (135 units), have maintained an 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.

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

The Master of Arts degree program is available to students who complete an undergraduate major in French or the equivalent. Students, in special circumstances, may make up work deficient in the major requirements and then continue with an advanced degree. Candidates will be recommended for admission to graduate study in French provided the requirements of the Graduate School and the Department of French and Italian have been met.

Basic requirements for the M.A. are a minimum residence of three quarters, 36 quarter units, and a passing score in the comprehensive examination, or 30 quarter units and the acceptance of a written thesis.

The doctoral program stresses individualized study suited to the student's interest. Particularly encouraged are programs that integrate the use of research materials in allied departments and programs such as Dramatic Art, Comparative Literature, English, etc. The Department regularly sponsors an exchange program with French institutions of learning. Basic requirements include demonstration of linguistic competence, passing of a qualifying examination, completion of an acceptable dissertation, and one year of teaching in the department as a Teaching Assistant.

Graduate Advisers. Maria I. Manes-Mancini (M.A. degree); M. E. Blanchard (Ph.D. degree).

Teaching Credential Subject Representative. Y. Wegnigrd. See also under the Teacher Education Program.

Courses in French
Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement. Students who have completed high school French normally need to take French 2, those with three years take French 3 and those with four years take French 21.

Lower Division Courses
1. Elementary French (5), I, II, III. The Staff
   Discussion—5 hours; laboratory—1 hour. Students who have successfully completed C or better French 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 or through 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.
   1G. French for Graduate Students (5). II, III. The Staff
   Chairperson in charge: Lecture-discussion—5 hours. A course designed to prepare students for the graduate reading examination in French. (P/N grading only.)
   2. Elementary French (5) I, II, III. The Staff
   Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.
   3. Elementary French (5) I, II, III. The Staff
   Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.
   5. Introduction to French Phonetics (2) I, II. The Staff
   Lecture—5 hours. A course designed to acquaint the student with the phonetic characteristics of French.
   8. French Conversation (2) I, II, III. The Staff
   21. Intermediate French (5) I, II. The Staff
   22. Intermediate French (5) I, II. The Staff
   Lecture-discussion—5 hours. Prerequisite: course 22. Continuation of course 22. Grammar, oral practice, composition. Current topics in French politics

NOTE: For key to footnote symbols, see page 133.
and culture; reading and discussion of a novel.

25. Introduction to French Literature in Translation (3) I. The Staff Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major authors, genres, literary periods and movements, study of literary techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture/Non-Introductory.

35. Explication and Dissertation (2) II. The Staff (Chairperson in charge)
Lecture-discussion—2 hours. Prerequisite: course 22. Theory and practice of French explication de texte and dissertation. Especially recommended for those students planning to study abroad in French universities.

38. Intermediate French Conversation (2) I, II, III. The Staff Discussion—2 hours. Prerequisite: course 22. Practice in speaking French; weekly quizzes and an oral and written final examination. Not open to native speakers or to upper division students.

45. Introduction to French Literature (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 22. Selected themes in French literature.

98. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

100. Composition in French (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 23. Instruction and practice in expository writing in French, with emphasis on organization, correctness of syntax, and vocabulary-building.

101. Introduction to French Poetry (4) II, III. Abrahm, Blanchard Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and versification.

102. Introduction to French Drama (4) I, II, III. Abrahm, Blanchard 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. Practice in translation into French using a variety of texts illustrating different problems and styles.

104. Translation (4) I, II. The Staff Lecture—3 hours; short translations. Prerequisite: course 100 or consent of instructor. Practice in translation into French using a variety of texts illustrating different problems and styles.

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. Praeger 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.

108. Advanced French Conversation (2) I, III. The Staff Discussion—3 hours. Prerequisite: course 23 or consent of instructor. Advanced conversational practice stressing accurate pronunciation and spoken language fluency. Not open to native speakers. May not be counted toward French major. May be repeated once for credit.

110. Stylistics and Creative Composition (4) II. Herman Lecture—3 hours; frequent papers. Prerequisite: course 100 or consent of instructor. Intensive course in creative composition using a variety of techniques and literary styles, patterned on Queneau's Exercices de style. Practice in such stylistic modifications as inversion, anathesis, changes in tense, mood, tone, etc. The writing of poetry.

112. Masterpieces of French Drama in Translation (3) II. The Staff Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic structure and techniques. Consideration of this genre within French social and cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.


114. French Philosohical Literature in Translation (3) III. Blanchard Discussion—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad, philosophical, moral, and historical contexts. Focus on such topics as stoicism, liberal humanism, naturalism, existentialism, Marxism, and other movements. Literary techniques and styles analyzed. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.

115. Medieval Literature: Epic and Romance (4) Herman Lecture—3 hours; term paper. Prerequisite: course 100 and 103 or consent of instructor. The Chanson de Roland, Tristan et Iseult, and selected works of Chrétien de Troyes. Texts to be read in modern French.

116. Literature of the Sixteenth Century (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Rabelais and Montaigne. Critical study of the works in relationship to the period.

117A. Classical Tragedy (4) III. Abraham Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Study of plays of Racine and Corneille.

117B. Classical Comedy (4) Abraham Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Study of works of Molière and other writers of comedy of the seventeenth century.

117C. The Moralists (4) II. Bloomberg Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Study of works of such moralists as Pascal, La Rochefoucauld, La Bruyère, Descartes, the Chevalier de Méré, and Bossuet.

118A. Les Philosophes (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Readings from Montesquieu, Voltaire, Diderot, Rousseau, and the Encyclopédie.

118B. The Novel in the Eighteenth Century (4) II. Kuczynski Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Novels of Lesage, Prévost, Diderot, Rousseau, Laclos, Sade.

118A. The Nineteenth Century (4) II. Hannoch Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Romanticism in the drama and novel. Plays of Hugo and Musset, novels of Stendhal, Nerval, Flaubert, Maupassant, and Zola.

119C. Nineteenth-Century Poetry II. Hannoch Lecture—3 hours; term paper. Prerequisite: courses 100 and 101 or consent of instructor. Poetry from the Pre-Romantics to Baudelaire.

120A. Twentieth-Century Drama (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Representative plays from Giraudoux to Anouilh.

120B. Twentieth-Century Drama (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Sert, Beckett, Ionesco, and Chéreau and Ionesco.

121. Twentieth-Century Novel (4) I. Blanchard Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Sert, Beckett, Ionesco, and novels of André Gide and novels of Marcel Proust.

122. Twentieth-Century Novel (4) I. Praeger Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. From Malraux to the Nouveau Roman, including such novelists as Sartre, Camus, de Beauvoir, Bernanos, Mauriac, Céline, Robbe-Grillet, Simon, Butler.

123. Twentieth-Century Poetry (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: courses 100 and 101 or consent of instructor. Selected poetic texts from Apollinaire to the present, including such poets as Saint-John Perse, Breton, Aragon, Reverdy, Eluard, Desnos, Ponge, Ch., Michaux, Bonnefoy.

135. Advanced Composition (4) III. Praeger Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Practice in advanced composition, using the French dissertation as model, with occasional explications de texte.

138. Advanced Literary Translation (4) II. Bloomberg Lecture—3 hours; term paper. Prerequisite: courses 100 and 104 or consent of instructor. Morphological, syntactical, and stylistic aspects of English-French translation.

140. Study of a Major Writer (4) II. The Staff (Chairperson in charge) Lecture—3 hours; term paper. Prerequisite: course 100 and courses 101, 102, or 103 as appropriate to the selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated once for credit as author-subject changes.

141. Selected Topics in French Literature (4) II. The Staff (Chairperson in charge) Lecture—3 hours; term paper or short paper. Prerequisite: courses 100 and 104 or consent of instructor. Morphological, syntactical, and stylistic aspects of English-French translation.

150. Masterpieces of French Literature in Translation (3) III. Blanchard Discussion—3 hours; short papers. Prerequisite: course 25 and either course 112, 113, or 114, or consent of instructor. Selected masterpieces of French literature. Works to be analyzed in broad generic, philosophical, historical contexts. Emphasis also on literary techniques.

NOTE: For key to footnote symbols, see page 133.
159. French Phonetics (3) I. Maneu-Manolou
Lecture—3 hours. Prerequisite: course 23, linguistics 1. Analysis of the sounds of English and French; practical exercises in the pronunciation of modern French, with special emphasis on the problems of English-speaking students.

160. Structure of the French Language (4) II. Maneu-Manolou
Lecture—3 hours; short papers. Prerequisite: course 23; linguistics 1. Analysis of the sounds and functions of the main grammatical categories of French in framework of recent structural approaches.

161. Modern French Syntax (4) III. Maneu-Manolou
Lecture—3 hours; short papers. Prerequisite: course 160. Presentation of basic concepts of contemporary approaches to French syntax. Consideration of new explanations of so-called "irregular" phenomena in current language models.

162. History of French Language (4) II. Maneu-Manolou
Lecture—3 hours; term paper. Prerequisite: course 160. Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language.

192. Internship (1-12) I, II, III. The Staff
Internship—3-36 hours; term paper. Prerequisite: upper-level standing as inheritance of instructor. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Independent study—1-5 hours. Prerequisite: open only to French majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or language. (P/NP grading only.)

197T. Tutoring in French (1-4) I, II, III. The Staff
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4) I, II, III. 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 member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200. Literary Analysis (2) I. Blanchard
Proseminar—1/2 hours, short papers. Prerequisite: graduate standing. Required of all graduate students in French, this prosemear is designed to acquaint students with basic principles of applied literary theory.

201. History of French: Phonology and Morphosyntax (4) III. Maneu-Manolou
Seminar—3 hours; term paper. Prerequisite: courses 159, 180, 250A, or consent of instructor. Presentation of language change in the phonemic and grammatical structures of French, from Latin to contemporary spoken aspects.

202A. Medieval French Literature: The Epic Tradition (4) II. Herman
Seminar—3 hours. Prerequisite: course 201 recommended. Literary and stylistic study of selected chansons de geste. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

202B. Medieval French Literature: The Romance Tradition (4) I. Herman
Seminar—3 hours. Prerequisite: course 201 recommended. Chretien de Troyes and the doctrine of courtly love. Literature and stylistic study of Chretien's major works. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

205A. Sixteenth-Century Literature: The Humanists (4) I. The Staff
Seminar—3 hours. French humanism in its most varied forms. Although at different times Rebeval and Montaigne will be primarily studied, other leading intellectuels and religious writers will also receive attention. May be repeated for credit when different topic is studied.

205A. Seventeenth-Century Literature: Theater (4) II. Abraham
Seminar—3 hours. Works of Corneille, Racine, Moliere, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.

206B. Seventeenth-Century Literature: Prose (4) I. 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 different 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. Kuschnir
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.

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. Hannooz
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: Theater (4) II. The Staff
Seminar—3 hours. Study of the works of one or more dramatists of the period. May be repeated for credit with consent of instructor when different topics are studied.

208C. 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: Prose (4) II. The Staff
Seminar—3 hours; term paper and/or exposure. Study of the works of one or several writers of the period. May be repeated for credit with consent of instructor.

209B. Twentieth-Century: Theater (4) I. 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.

Note: For key to footnote symbols, see page 133.

210. Studies in Narrative Fiction (4) I. Preager
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

211. Studies in Criticism (4) II. Blanchard
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

212. Studies in the Theater (4) I. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

213. Studies in Poetry (4) II. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

214. Study of a Literary Movement (4) III. The Staff
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

215. 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: Morphemetics (4) I. Maneu-Manolou
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. Maneu-Manolou
Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectivization, passivization, relativization, etc.) focusing on the most recent developments in the field (i.e., case grammars, generative semantics, transformation theory, etc.).

251. Trends in French Contemporary Linguistics (4) I. Maneu-Manolou
Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc., intended for students in French linguistics or those interested in applying linguistic models to literature.

261. Current Issues in Modern French Syntax (4) II. Maneu-Manolou
Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Examination of various less regular phenomena, with reference to on-going changes in modern spoken French.

290. Research Methods (2) I. Abraham
Proseminar—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
(SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours. May be repeated for credit with consent of instructor.

299. Research (1-12) I, II, III. The Staff
(SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
(SU grading only.)

Professional Courses

300. Teaching of a Modern Foreign Language (3) III. Kaufman
Lecture-discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

French 253
Freshman Seminar Program

Evelyn M. Siliva, Ph.D., Program Director
Program Office, 17 Wellman (Teaching Resources Center) (916-752-6050)

Committee in Charge
Stephanie Beardsley, Ph.D. (Residence Life)
Erin Braddock (Student Representative, ASUCD—Academic Affairs)
Alan Jackman, Ph.D. (President’s Chair in Undergraduate Education)
Robert Powell, Ph.D. (College of Engineering)
David Robinson, Ph.D. (Committee on Educational Policy)
Harry Walker, Ph.D. (College of Agricultural and Environmental Sciences)
Carolyn Wink, Ph.D. (College of Letters and Science)
Dan Wick, Ph.D. (Teaching Resources Center)

Course in Freshman Seminar
(Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.)

1. Freshman Seminar (2) I, II, III.
   The Staff Seminar—20 hours total (8 weeks). Prerequisite: open only to students who have completed less than 44 quarter units. Investigation of a special topic through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

Genetics
(College of Agricultural and Environmental Sciences)
John A. Kiger, Jr., Ph.D., Chairperson of the Department
Department Office, 357 Briggs Hall (916-752-0200)

Faculty
James B. Boyd, Ph.D., Professor
Kenneth Burtis, Ph.D., Assistant Professor
Gordon J. Edlin, Ph.D., Professor
John H. Gillespie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Melvin M. Green, Ph.D., Professor Emeritus
John A. Kiger, Jr., Ph.D., Professor
Charles H. Langley, Ph.D., Professor
Timothy Prout, Ph.D., Professor Emeritus (Genetics, Entomology)
Raymond L. Rodriguez, Ph.D., Professor
Che-Kun J. Shen, Ph.D., Professor
Richard Snow, Ph.D., Professor Emeritus
G. L. Stebbins, Ph.D., Professor Emeritus
Michael Turelli, Ph.D., Professor

The Major Program
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 in improving domestic plants and animals.

Choice of College: Students may elect this major either in the College of Natural and Environmental Sciences or in the College of Letters and Science.

Students majoring in Genetics 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 material as upper division courses in the subject at UC Davis. Further information can be obtained from the Division of Biological Sciences office, 376 Mrak Hall.

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.)

Written/oral expression

Preparatory Subject Matter (4-7)

Preparatory Subject Matter (4-7)

Chemical Sciences (Biological Sciences 1A, 1B, 1C. Biological Sciences 1A may replace 1B; Zoology 2-3L may replace 1B; Botany 2 may replace 1C.) 14-16
Chemistry (Chemistry 1A-1B, 1C or 4A-4B; 4C; 8A-8B or 128A-128B-128C) 21-24
Mathematics (Mathematics 16A-16B-16C or 21A-21B-21C) 9-12
Microbiology 100 or 102 (102 recommended) 3-4
Physics (Physics 6A-6B-6C) 12
Statistics (Statistics 13 or 102) 4-5

Breadth General Education (28)

College of Agricultural and Environmental Sciences students:
Satisfaction of the General Education requirement plus social science and/or humanities electives to total 28 units.

College of Letters and Science students:
Refer to College section for a description of requirements to be completed in addition to the major.

Depth Subject Matter (25-27)

Biochemistry 101A-101B 8
Genetics 100, 100L, 102A, 102B
Three additional courses in genetics 9-10
Include at least one course from Genetics 102L, 104, 107; and one course from Genetics 103, 105, 106.

Restricted Electives (18-30)

Six upper division courses in biological sciences, mathematics, chemistry, or other fields relevant to the student’s interest chosen in consultation with the advisor, to at least two different areas.

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

NOTE: For key to footnote symbols, see page 133.
105. Population Genetics (4) I. Gillespie
Lecture—4 hours. Prerequisite: course 100; a course in graduate mathematics 16B. Population genetics including the effects of natural selection, migration, mutation, and genetic drift.

106. Evolutionary Quantitative Genetics (4) II.
Tutored Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Mathematics 16C, and Statistics 102. Experimental and theoretical analysis of polygenic traits. Topics include statistical experimental and methods of analysis as well as modern theoretical treatments with emphasis on applications to microevolution and macroevolution. Offered in even-numbered years.

107. Human Genetics (3) I. Sanders
Lecture—3 hours. Prerequisite: course 100 or the equivalent. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects.

190C. Introduction To Genomics Research (1) I, II, III, summer. The Staff (Chairperson in charge).
Discussion—1 hour. Prerequisite: upper division standing in Genetics or related biological sciences; consent of instructor. Discussion and critique of current research in genomics research by faculty, graduate, and undergraduate students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge).
Lecture—3-36 hours. Prerequisite: course 100 and consent of instructor. Technical or practical experience related to the analysis and prediction of genetic changes in populations. Offered in odd-numbered years.

197T. Tutoring in Genetics (1-5) I, II, III. The Staff (Chairperson in charge).
Tutored Lecture—1-5 hours. Prerequisite: upper division standing and consent of instructor. Conducting of discussion groups affiliated with one of the department's regular courses. (P/NP grading only.)

198. 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 based on adequate preparation of the student in allied fields. (P/NP grading only.)

Graduate Courses

202. Plasmids, Recombinant DNA, and Genetic Engineering (3) I. Rodriguez
Lecture—3 hours. Prerequisite: course 102A or Microbiology 130A-130B, or consent of instructor. Presentation of recent experiments in recombinant DNA technology. Description of biochemical and genetic properties of bacterial plasmids. (SU grading only.) Offered in odd-numbered years.

203. Advanced Evolution (3) III. Goldblatt
Lecture—1 hour; discussion—2 hours. Prerequisite: graduate status. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in odd-numbered years.

205. Theoretical Population Genetics (4) I. Gillespie, Langley
Lecture—4 hours. Prerequisite: course 105; Mathematics 22A, and Statistics 130A or 131A, and consent of instructor; Mathematics 229 recommended. Mathematical theory of population genetics with emphasis on the assumptions underlying the standard models and the mathematical techniques used to derive the conclusions. (SU grading only.) Offered in odd-numbered years.

209. Molecular Evolution (3) I. Gillespie, Langley, Turelli
Lecture—3 hours. Prerequisite: Biochemistry 101B; course 105 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, and the effects of molecular evolution on population genetics. Offered in even-numbered years. (SU grading only.)

290C. Research Conference in Genetics (1) I, II, III. The Staff (Chairperson in charge).
Discussion—1 hour. Prerequisite: graduate standing in Genetics; consent of instructor. Presentations and discussions of current research in genetics. Intended primarily for graduate students. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff
(SU grading only.)

Professional Course

300. Methods In Teaching Genetics (1) I, II, III. The Staff (Chairperson in charge).
Lecture-discussion—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of texts and other materials, teaching techniques, preparing for and conducting discussion and laboratory sections, preparing examinations. May be repeated for credit. (SU grading only.)

Genetics (A Graduate Group)

Calvin O. Quail, Ph.D., Chairperson of the Group
Group Office, 357 Briggs Hall (916-752-9071)
Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. Consult Genetics Graduate Group Office.

Courses in Genetics

Graduate Courses

220. Advanced Genetics Laboratory (5) I, II, III. The Staff
Laboratory—15 hours. Prerequisite: Genetics 100 or the equivalent; enrollment in Genetics Graduate Group. Student is assigned to genetics research laboratory. Individual research problems with emphasis on methodology/procedural experience and experimental design. May be repeated twice for credit, in different laboratories. (SU grading only.)

221. Transmission Genetics (3) I. Gepts
Lecture—3 hours. Prerequisite: Genetics 100, introductory statistics, and calculus. Study of segregation, linkage, and mapping and the modification of Mendel's original genetic model.

222. Cytogenetics (3) I. Dvorak, Murray
Lecture—3 hours. Prerequisite: course 221. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuploidy, trisomics, monosomes, antibodies, and interspecific manipulations.

223. Molecular Genetics (3) I. Burris, Williamson
Lecture—3 hours. Prerequisite: course 221 or consent of instructor. Current topics in molecular genetics at a graduate level. Emphasis on the relationship between classical genetic studies and current molecular research, as well as on the molecular techniques used to develop the basic concepts of molecular genetics.

224. Quantitative and Population Genetics (3) I. Touchberry
Lecture—3 hours. Prerequisite: course 221 or consent of instructor. The basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, pheno- typic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

291. Seminar in History of Genetics (2) III. Griesemer
(Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel.

292. Seminar in Molecular Genetics (1-3) I. Tyler
Seminar—1-3 hours. Prerequisite: course 221. Topics related to the deletion, duplication, and rearrangement of chromosome regions.

293. Seminar in Quantitative Genetics (1-3) III. Teuber
Seminar—1-3 hours. Prerequisite: course 221. Topics related to the incidence and the inheritance of continuous characteristics.

295. Seminar in Developmental Genetics (1-3) III. Kiger
Seminar—1-3 hours. Prerequisite: course 221. Topics in the area of cell-specific control of genes in development.

296. Seminar in Population, Evolutionary, and Ecological Genetics (1-3) I. Jain
Seminar—1-3 hours. Prerequisite: course 221. Topics related to the analysis and prediction of genetic changes in populations.

Prerequisite: consent of instructor. Group Study of selected topics in Genetics. (SU grading only.)

(SU grading only.)

Geography

(College of Letters and Science)
Jack D. Ives, Ph.D., Chairperson of the Department
Department Office, 280 Kerr Hall (916-752-0790)
Faculty
Conrad J. Bahe, Ph.D., Associate Professor
Mary B. Cunha, M.A., Lecturer
Robin E. Date, Ph.D., Lecturer
Dennis J. Dingesmann, Ph.D., Associate Professor
Deborah L. Ellick-Friek, Ph.D., Associate Professor
Howard F. Gregor, Ph.D., Professor Emeritus
Louise E. Girott, Ph.D., Professor (Geography, Nutrition)

The Major Program

Geography is a multifaceted discipline defined by its concern with place. Since antiquity, geography has embraced four traditions: spatial; area studies; Man- land; and earth sciences. Geographers strive to answer spatial questions regarding the earth's surface and adjacent atmosphere to define the character of regions; to ascertain the ways in which humans, historical and contemporary, have utilized and shaped the earth's surface, and to understand the physical, biotic, and human systems of our global environment and their mutual interactions.

NOTE: For key to footnote symbols, see page 133.
The curriculum of the major permits students to pursue a program of study compatible with individual needs, interests, and objectives. In the Bachelor of Arts program, the student may choose a general program, or specialize in cultural/historical geography, economic/urban geography, physical geography (including biogeography), or regional planning and analysis. The Bachelor of Science program is for students with strong science backgrounds who are interested in some aspect of physical geography. Both programs include opportunities for developing skills in cartography, field techniques, quantitative methods, and remote sensing, and are planned in consultation with the major adviser. Geography is an essential component of a liberal education, and the major is intended to provide an opportunity for broad intellectual enrichment. Students trained in undergraduate geography have advantages in pursuing careers in international trade, travel, and politics; environment, and resource-oriented government employment; cartography and remote sensing, primary and secondary education; and urban and regional planning.

A.B. Major Requirements:

Preparatory Subject Matter

Geography 1, 2, and 5 ........................................... 10

Depth Subject Matter

Geography 108 or 106, 151, and one UCD regional course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, 127, ................................................. 38-44

Choose one emphasis from the following five:

Emphasis I (General) ........................................... 24-26

One course from each of the following three groups:

a. Geography 170 and 171
b. Geography 141 and 155
c. Geography 108 and 115

Four additional upper division geography courses. ............................... 20

Emphasis II (Cultural/Historical) ........................................... 26

Geography 170, 171, one course from Geography 108, 115, 141, 155

Four additional courses from Geography 110, 143, 172, 173, 175

Emphasis III (Economic/Urban) ........................................... 28

Geography 110, 141, 155, one course from Geography 108, 115, 170, 171

Three additional courses from Geography 104, 142, 143, 156, 160, 161, 182

Emphasis IV (Physical) ........................................... 31-32

Geography 110, 125, 126, 127, one course from Geography 141, 155, 170, 171

One additional course from Geography 102, 112, 116, 117, 161

Emphasis V (Regional Planning and Analysis) ........................................... 26-32

Geography 155 or 156, 110, one additional course from 121-127, and one course from Geography 142, 160, 161, 162, 170, 173

Environmental Biology and Management 110 and 134, or Environmental Studies 171, Political Science 107 or Environmental Studies 161, plus one course from Economics 115A, Agricultural Economics 148, or Geology 134.

Total Units for the Major ........................................... 48-84

Recommended: Geography 4

B.S. Major Requirements:

Preparatory Subject Matter

Geography 1, 2, 3, and 5 ........................................... 14

Statistics 13 or the equivalent ........................................... 4

Mathematics 1A, 1B, 16B, and 16C, or Mathematics 21A, 21B, and 21C ........................................... 9-12

Computer Science Engineering 10 or 30 ........................................... 3-4

Chemistry 1A, 1B, 1C or 4A, 4B, 4C ........................................... 15

Biological Sciences 1 ........................................... 5

Zoology 2-2CL or Botany 63-6E ........................................... 5-8

Depth Subject Matter


Two courses from Geography 102, 110, 112, 116, 117, 162, 173 ........................................... 7-8

One course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, 127, ........................................... 3-4

Four additional upper division, letter-graded units in Geography ........................................... 4

Nine additional upper division units chosen in consultation with the undergraduate adviser. ........................................... 9

Total Units for the Major ........................................... 100-109

Recommended: Geography 4, Physics 8A, 8B and 8C, Chemistry 9A and 9B

Addendum: The B.S. major provides a wide diversity of possible themes, including geomorphology, climatology, zoogeography, 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

Chemistry 1A, 1B, 1C or 4A, 4B, 4C ........................................... 15

Biological Sciences 1 ........................................... 5

Zoology 2-2CL or Botany 63-6E ........................................... 5-8


Two courses from Geography 102, 110, 112, 116, 117, 162, 173 ........................................... 7-8

One course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, 127, ........................................... 3-4

Four additional upper division, letter-graded units in Geography ........................................... 4

Nine additional upper division units chosen in consultation with the undergraduate adviser. ........................................... 9

Total Units for the Major ........................................... 100-109

Courses in Geography

Lower Division Courses

1. Physical Geography (4) I, II, Jett

Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climatic, hydrologic, soils, and natural vegetation.

2. Introduction to Cultural Geography (3) I, II, III. The Staff

Lecture—3 hours. Traditional systems of habitat use: their characteristics, origin, occurrence, ecology. Development of contemporary cultural patterns and methods in man-hand relationships. Emphasis on the nonindustrial world. General Education credit with concurrent enrollment in course 2G. Contemporary Societies/Introduction

3. Climate and Weather (3) I, II, III. Shilton

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 climatic data, weather maps, severe storms: global, regional, and local climate and weather; climatic change; climate of California.

4. Maps and Map Interpretation (3) L. Bahre

Lecture—3 hours. Properties and components of maps. Major classes of projections, types of maps, emphasis, relief, cadastral, thematic, and modern trends in mapping. History and development of cartography.

5. Introduction to Urban and Economic Geography (5) I. The Staff

Lecture—3 hours. The location of economic and urban activities. Patterns and theories of spatial organization: resource development, agricultural and manufacturing regions, urban systems, and urban structure. General Education credit with concurrent enrollment in course 5G. Contemporary Societies/Introduction

6. Human Impacts on the Landscape (4) I. The Staff

Lecture—4 hours. Local and global effects, through time; human occupation, economies, and technologies on wild and domesticated flora and fauna, soils, water, landscapes; climate. Emphasis on landscape modification. Not intended for students planning to take course 161 or 170.

10. The World's Regions (3) J. Dingemans, III, Jett

Lecture—3 hours. The major geographic regions of the world; their origins, physical environments, cultures and economies; their interactions and global role. Designed for non-majors.

50. Geography and Environmental and Regional Planning (3) III. 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 (1-6) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Independent Study (1-5) I, II, III. The Staff (Chairperson in charge)
Upper Division Courses

102. Field Course in Physical Geography (4) III. Elliott-Fisk
Lecture and field trip—normally one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Field study 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.

104. Field Course in Urban Geography (4) III. Dingemans
Lecture—1 hour; full-day 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 4 or consent of instructor. Compilation and generalization of base-map data; symbolism and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing I, II, III. Bahre
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic photogrammetry, sensors and platforms, aerial-photo interpretation, and remote-sensing.

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 scribbling, plate-making, process photography, color separation, and color proofing. Use of contemporary cartographic and photographic equipment utilized in producing maps.

108. Analysis of Landforms (4) I. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural landforms, rock weathering and soil genesis, hillslope processes, and fluvial, glacial, and coastal landscapes.

110. Quantitative Spatial Analysis (4) III. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 6, and Statistics 10 or 102 recommended. Methods of research and location planning; quantitative summary and analysis of spatial data patterns and trends; optimal-location solutions; includes correlation, regression, and use of computer programs for analysis.

112. 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 geomorphic processes found along coasts. Analyses of coasts in a variety of lithologic, lectonic, and "wave-climate" settings. Emphasis on the Quaternary history of coastal landscapes. Offered in even-numbered years.

115. Mesoclimatology (4) III. Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Areal energy and moisture exchanges at the earth-atmosphere interface: physical controls, spatial and temporal variations, measuring and modeling the exchange processes, classification of mesoclimates. Climatic and related processes in areal systems. Human alteration of mesoclimates. Offered in odd-numbered years.

116. Climate Change (4) II. Elliott-Fisk, Shelton
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 3 and 115. Advanced magnitude, timing, and causes of climate change. Spatial and temporal climatic variations within the Quaternary emphasized. Offered in even-numbered years.

117. Quaternary Environments (3) I. Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A or consent of instructor. Introduction to the character, timing, and magnitude of environmental changes during the Quaternary (Pleistocene and Holocene). Analysis of methods of paleo-environment identification and interpretation. Survey of the Quaternary record for selected regions.

118. Mountain Geocology: Physical Geography (4) III. Ives
Lecture—3 hours; term paper. Prerequisite: course 1 or other introductory natural science course. Broad overview of world mountain systems, including tectonics and structure, climate and vegetation, geomorphic processes. Student will integrate relevant section of cognate disciplines to focus on three-dimensional character of mountain regions—a physical geography of mountains.

120. Deserts of California and the Southwest (3) III. Jett
Lecture—3 hours. Prerequisite: courses 1 and 2 or the equivalent recommended. Physical and human geography of the Mojave, Sonoran, and Chihuahuan deserts of the U.S., an ecological comparison, and the southern Great Basin. Desert origins, climate, vegetation, and landforms. Cultures and histories of Native tribes, Hispanic-Americans, and Anglo-Americans. Offered in odd-numbered years.

120L: Field Excursion to Californian and Southwestern Deserts (2) III. Jett
Fieldwork—60 hours minimum (1 week). Field excursion to examine physical and human geography of selected deserts in California, Nevada, Arizona, and Utah. May be repeated for credit. Limited enrollment; preference given to students having completed course 120 (P/NP grading only). Offered in odd-numbered years.

121. North America (4) IV. II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human forces have contributed to their variety. Regional stresses within and between the two countries.

122A. Mexico and Central America (4) II. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environments, culture, and economy from Mexico to Panama and in the Caribbean. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of Middle America. Approach will be cultural/historical and ecological. Offered in odd-numbered years.

122B. South America (4) II. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of South America. The approach will be cultural/historical and ecological. Offered in even-numbered years.

123. Western Europe (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Natural and cultural environments and their relation to the economic, social, and political problems of the countries of Western Europe.

124. The Soviet Union and Eastern Europe (4) I. Dingemans
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in the social sciences; course 2 or 5 recommended. Human use of the land in the Soviet Union and East Europe. Location and nature of resources, agriculture, industry, and cities. Emphasis on modernization of traditional landscapes by the Soviet model of planning for regional development. General Economic, Social, Political, and Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 2, 5, Economics 1A-1B, Anthropology 2, or Political Science 2.

125A. North Africa and the Middle East (4) I. Grietti
Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geography of the Islamic world of North Africa and Southwest Asia; climatic and physical features of settlement patterns, and the influence of Islam; economic patterns and development.

NOTE: For key to footnote symbols, see page 133.

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 Africa south of the Sahara.

126. Southern Asia (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Offered in even-numbered years.

127. Contemporary East Asia (4) III. Dingemans
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in the social sciences; course 2 or 5 recommended. Human use of the earth in East Asia. Location and nature of resources, agriculture, industry, and cities. Modernization of traditional rural and urban landscapes. Emphasis on contemporary China and Japan as contrasting paths to economic development.

131. California (4) III.
Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, vegetation, and soils; water, agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.

141. Organization of Economic Space (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal environmental, economic, political, and cultural forces contributing to the regionalization of the world's economic activities. Outline of the more important regional patterns resulting from the interplay of these forces. Emphasis will also be put on these aspects as they pertain to the problems of regional disparities both within and between nations.

142. Geography of Agriculture (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Distribution and areal variety of the world's food-producing areas, and the ways physical, historical, cultural, and economic factors have influenced these aspects of agriculture. Current and future trends and associated resource problems.

143. Political Geography (4) I. The Staff
Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

151. History of Geographic Thought (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: three upper-division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

155. Urban Geography (4) III. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Growth and land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning policy, transportation systems, and residential structure. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5.

156. The Urban Region (4) I. Dingemans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Location and functional interdependence of cities. Relations between city and hinterland, including labor shed, service area, and economic base. Role of urbanization in regional development.

160. World Resource Patterns (3) I. The Staff
Lecture—3 hours. Prerequisite: upper division standing. Principal world patterns of resource distribution. Concentrations and voids, and their significance for economic development and the welfare of the state. Focus on both natural and human resources of the geographic complex. Resource status of major economic regions.

181. Conservation of Resources and Environment (4) III.
Lecture—4 hours. Principles of natural-resource and
Geology

Graduate Courses
200. Research Trends in Geography (1-3) I. The Staff
   (Chairperson in charge)
Seminar—1 hour. Major current research themes and
trends in geography. (S/U grading only.)

201. Sources and General Literature of Geography
   (4-8) I, II, III. The Staff
Discussion—4 hours. Prerequisite: graduate status
in geography; consent of instructor. Designed for
students preparing for higher degrees in geography.
May be repeated for credit in one or more of the fol-
lowing subfields: physical, cultural, economic,
urban, historical, political, conservation, and regio-
nal geography.

290. Seminar: Selected Regions (4) III
Seminar—3 hours. Region to be announced annually.

291. Seminar in Cultural Geography (4) I, Jett
Seminar—3 hours.

292. Seminar in Plant Geography (4)
Seminar—3 hours; seminar paper. Prerequisite:
graduate standing. Examination of that aspect of cul-
tural plant geography dealing with human impacts
and vegetation change in the earth's major biomes.

293. Seminar in Political Geography (4)
Seminar—3 hours.

294. Seminar in Climatology (4) I, Jett
Seminar—3 hours.

295. Seminar in Urban Geography (4) III. Dingem-
sams
Seminar—3 hours.

296. Seminar in Agricultural Geography (4) I, Jett
Seminar—3 hours. The Staff

298. Group Study (1-6) I, II, III. The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff
(Chairperson in charge)
(S/U grading only.)

2990. Individual Study (1-12) I, II, III. The Staff
Prerequisite: graduate student status in Geography
and consent of instructor. (S/U grading only.)

The Major Programs
"Civilization exists by geological consent—subject to
change without notice."
Will Durant

Geology is a science that has the whole Earth and
other planetary bodies as its laboratory. In effect, it is
an extension of history and archaeology to a much
longer time scale and less well-preserved record.
Geology involves the application of biology,
chemistry, and physics to the study of the past and
present Earth and its neighbors in space. Geologists
appreciate Earth and other planets from three differ-
ets perspectives—geological, biological, and phys-
ical.
The scientific perspective involves an understanding
of the planets and how and why they change and
evolve. The human perspective involves the geology
responsible for Earth's climate, volcanoes, and
volcanic eruptions, landslides, the concentration of
mineral resources, and the ever-increasing problems
of air and water supply. The aesthetic level involves
enjoyment of the natural beauty of the subjects we
study, such as the mountains, the lakes, the river
valleys, the seashores, or even crystals in a micro-
scope.

Geologists practice their profession in a variety of
settings—resources, recreational, governmental,
industry, commerce, education, universities, and
professional organizations. In addition, there is a
strong professional society

High school students should note that the prepara-
tion for either program requires high school chem-
istry and four years of mathematics or the equivalent.
Transfer students applying to the B.S. degree pro-
gram will find it helpful to have completed a course
in general geology with laboratory or sophomore-
ship with the equivalent of either Chem-
istry 1A-1B or Physics 5A-5B-SC, as well as
Mathematics 1A-1B-SC.

Honors. Students majoring in Geology who are eligi-
able for Honors at graduation, who have completed
at least 135 units, and who have attained a grade-point
average of at least 3.5 in courses required for the major
may further qualify for High or Highest Honors
by completing the two-course sequence, Geology
194HA and 194HB. This senior honors project serves
as a basis on which a supervising committee may
recommend the award of High or Highest Honors.

A.B. Major Requirements:

Preparatory Subject Matter
Geology 3, 3L, 50, 50L, 60, 60L
Mathematics 16A-16B-16C or 21A-
21B
Chemistry 1A-1B or 4A-4B
Physics 5A-5B-SC

Depth Subject Matter
Geology 102, 105, 106L, 110, 110L,
129, 123, 131, 132, 133, 134
27

Additional upper division elective chosen
from selected courses in geology and
related fields approved in advance by
the major adviser (see adviser for list of
required courses and electives).
One elective course chosen from Chemical Engineering 151, Chemistry 126, Engineering 130, 134, Geology 150A, Soil Science 102, Water Science 180.

Minor Adviser: R.E. Cress.

Geomorphology emphasis
Geology 50 or 50L (or 1, 1G, and 1L).

Geology 152 or Geology 106.

Geology 153 or 154.

At least six additional units chosen from:
Civil Engineering 171, 172, 177
Geography 112, 117, 118
Soil Science 118, 120
Water Science 141 or Civil Engineering 142.

Minor Adviser: C.G. Higgins.

Geophysics emphasis

Geology 117A, 117B, S181.


One course sequence chosen from the following:
6-12
(a) Atmospheric Science 120, 121A, 121B.
(b) Electrical and Computer Science Engineering 112, 151, 161.
(c) Geology 105, 162, Physics 105C.
(d) Mathematics 128A, 128B, 128C.
(e) Physics 104A, 104B, 105C.

Minor Adviser: J.S. McClain.

Oceanography emphasis

Geology 106, 116, 150A, 150B, 150C.

One course chosen from:

Minor Adviser: S.V. Margolis.

Paleobiology emphasis
Geology 110 and 110L, or 107 and 107L.

Geology 111A or 111B, 145 or 146.

At least six additional units from the following:

Minor Adviser: R.J. Twiss.

Teaching Credential Subject Representative, C.G. Higgins. 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 Adviser, Department of Geology.

Graduate Advisers: J.F. Mount, J.S. McClain.

Courses in Geology

Lower Division Courses

1. The Earth (3) I, II. The Staff

Lecture—3 hours. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 1G. Nature and Environment/Introduction.

1G. Earth: Discussion (1) I, II. The Staff

Discussion—1 hour. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course. General Education credit with concurrent enrollment in course 1: Nature and Environment/Introduction.

1L. Earth Laboratory (1) I, II. The Staff

Laboratory—3 hours. Prerequisite: course 1. Support laboratory for Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50.

3. History of Life (3) III. The Staff

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 3G: Nature and Environment/Introduction.

3G. History of Life: Discussion (1) III. The Staff


3L. History of Life Laboratory (1) III. The Staff

Laboratory—3 hours. Prerequisite: course 3 concurrently. Exercises in understanding the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution.

12. Evolution and Paleobiology of Dinosaurs (3) III. Carlson, Cowen

Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.

17. Earthquakes and Other Earth Hazards (2) III. Verosub

Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his environment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

20. Geology of California (2) II. Matthews

Lecture—2 hours; demonstration—1 hour. The geologic history of California, the origin of rocks and the environments in which they formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape.

43. Form, Function, and Evolution: The Molluscan Shell (3) I. Vermeij

Lecture-discussion—2 hours; term paper. Prerequisite: course 1, 3, or Biological Sciences 10. Evolutionary principles relating form and function, and evolution are explained through the study of shells of living and fossil mollusks. Topics include shell geometry, mechanical design, adaptation to enemies, and the distribution of shell architectural types in space and time. General Education credit: Nature and Environment/Nonintroductory. Recommended GE preparation: Geology 1 or 3 or Biological Sciences 10.

50. Physical Geology (3) I. Green

Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tec-tonics. Students with credit for course 1L or the equivalent may receive only 2 units for course 50.

50L. Physical Geology Laboratory (2) I. Green

Laboratory—6 hours; one or two one-day field trips. Prerequisite: course 50 (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and interpretation to topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L.

60. General Mineralogy (3) I. Hofmeister

Lecture—3 hours. Prerequisite: Chemistry 1A or 4A. Crystallography: physical and chemical structure and properties of minerals; mineral groupings.

60L. General Mineralogy Laboratory (2) I. Hofmeister

Laboratory—6 hours. Prerequisite: course 60 (preferably taken concurrently). Morphological crystallography; stereographic projection; identification of the common rock-forming minerals.

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

102. Field Geology (5) III. Twiss

Lecture—1 hour; laboratory—2 hours, field study—4 full days. Prerequisite: courses 105L, 106, 123, 124
111B. Paleobiology of Prokaryotes (4). II. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematic, evolution, and ecology of single-celled organisms. Offered in odd-numbered years.


113G. The Solar System: Discussion (1). III. Hofmeister Discussion—1 hour. Prerequisite: course 113 concurrently. Small discussion groups and preparation of papers for course 113. Part of general education.

115. Geochemistry (3). I. Criss Lecture—3 hours. Prerequisite: Chemistry 1A (may be taken concurrently). In course 50, principles of solutions, solution, structural and isotopic chemistry to geologic problems. Formation of carbonate rocks and other chemical sedimentary rock processes. Use of geologic setting, tools of the trade, use of pecking tools, and other processes to understand the geology of the solar system.

116. The Oceans (3). III. Margolis Lecture—2 hours and one field trip division standing or consent of instructor. Introduction to the study of the marine environment. Oceanic physical phenomena, chemical constituents, geological history, and the sea’s role. Emphasis on the geology of the oceans.


117A. Geophysics: Gravity and Magnetics (3). II. Veraaub Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 9C and Mathematics 21C or consent of instructor. Introduction to the use of physical tools in the study of earth structures and processes: gravity, paleomagnetism, geometrics. Application to geophysical exploration as well as solid earth geophysics.

117B. Geophysics: Seismology and Heat Flow (3). I. McClain Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 9B or 9B and Mathematics 21C or consent of instructor. Introduction to the use of physical tools in the study of earth structures and processes: seismology, heat flow. Application to geophysical exploration as well as solid earth geophysics.

118. Summer Field Geology (8). Extra-session summer. Mount Lecture—6 hours in field. Prerequisite: course 102. Preparation of a geologic map and report on a selected field area.

122. Optical Mineralogy (3). III. The Staff Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 60, 60L or consent of instructor. Optical properties of crystals and techniques of mineral identification with the petrographic microscope.

123. Igneous Petrology (5). II. The Staff Lecture—3 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 122; course 123 recommended. Occurrence 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). I. Matthews Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects.

131. Earth Science, History, and People (4). I. Core Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1. Study of the interactions between the earth and its human inhabitants through history, including conflicts, weathering, and catastrophic events such as earthquakes and eruptions as well as the geology of resources, topography, and water. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: General Education 1-1G.


135. Rivers of California: Geology and Land Use (3). III. Mount Lecture—2 hours; discussion—labatory—3 hours. Prerequisite: courses 1, and 1 or 1.1. Analysis of the conflict between geologic processes and the urbanization and resource exploitation of California’s watersheds. Mining, logging, and dam construction. Case studies of Sierra Nevada watersheds. Field study includes two raft trips on Sierran rivers and visits to Auburn Dam site. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 1.

138. Seminar in Stratigraphic Paleontology (3). III. The Staff Lecture—1 hour; seminar—2 hours. Prerequisite: courses 3, 3, and 3, 106. Introduction to zone and range concepts, geologic time, and pertinent aspects of the stratigraphic and zoological nomenclature. Participants analyze major evolutionary developments within animal, plant, and plant phyla as keys to geological age determinations.

140. Geologic Data Collection and Report Presentation (2). The Staff Lecture—2 hours. Prerequisite: upper division standing and a major in Geology. Collection, organization and presentation of data for geologic reports. Participating students analyze major evolutionary developments within animal, plant, and plant phyla as keys to geological age determinations.


180. Sample Preparation and Techniques (1) II. Winter Laboraory—3 hours. Prerequisite: course 122. Introduction to petrographic laboratory techniques for petrographers. Topics covered may include thin and polished section preparation, rock crushing and grinding, mineral separation, staining, and photomicroscopy. (PINP grading only.)

185. Advanced Field Geology (1,6) II, I, III. The Staff Fieldwork—3—10 hours; repeat. Prerequisite: course 116 or graduate standing in Geology. Advanced problems and methods in geologic field studies; preparation of a geologic report. May be repeated for total of 6 units when different subject matter studied.

190. Seminar in Geology (1, I, II, I, III. The Staff Discussion—1 hour; seminar—1 hour. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (PINP grading only.)

192. Internship in Geology (1—12) I, II, I, III. The Staff Work-experience. Prerequisite: upper division standing; project approval prior to internship. Supervised work-experience in geology. May be repeated for credit for a total of 10 units. (PINP grading only.)

194HA, 194HB. Senior Honors Project (3—3) I, II, III. The Staff (Chairperson in Charge) Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of the project.)

196. Directed Group Study (1—5) I, II, III. The Staff (Chairperson in Charge) Prerequisite: senior standing in geology or consent of instructor.

199. Special Study for Advanced Undergraduates (1—5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

206. Stratigraphic Analysis (3) III. Margolis Lecture—3 hours. Prerequisite: courses 105 and 106 or consent of instructor. Advanced historical analysis of stratigraphy and geologic history of North America and selected parts of other continents. Emphasis on interpreting lithologic assemblages and stratigraphic relations in terms of modern tectonic-depositional models.

209. Origin and Significance of Metamorphic Textures (4) III. Green Seminar—3 hours laboratory—3 hours. Interpretation of metamorphic textures in terms of surface energy anisotropy, growth anisotropy, crystal deformation processes, and disequilibrium phenomena. Offered in odd-numbered years.

213. Studies in Geomorphology (3) II. Higgins Lecture—3 hours. Prerequisite: course 133 or Geography 108. Topics selected from: studies of landforms and landscape development and of the action of formative processes, methods of analysis of geomorphic problems, development of geomorphic theory. Topics change from year to year. May be repeated three times for credit.

215. Advanced Geochemistry (3) I. Geology Lecture—3 hours. Prerequisite: course 115, Chemistry 110A or consent of instructor. Principles and applications of nuclear chemistry to geology: radiogenic and non-radiogenic methods. Trace element geochemistry. Topics covered include age and origin of earth materials, geothermometry, paleoclimates, and applications to the study of earth processes.

216. Tectonics (3) II. Moore Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Nature and evoluation of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts.

217. Topics in Geophysics (3) I. Van Fleet Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit. Offered in odd-numbered years.

218A. Structural Analysis I: Microfabrics (3) II. Taylor Seminar—3 hours. Prerequisite: consent of instructor. Geometric and kinematic analysis and interpretation of mesoscopic and macroscopic geologic structures and fabrics; geometry of folding, superposed folding, and foliation lineations; interpretation of fabric deformations, and regional structural synthesis. Offered in odd-numbered years.

218B. Structural Analysis II: Microlithons (4) III. Green Seminar—3 hours; laboratory—3 hours. Prerequisite: course 218A recommended. Microscopic structural aspects of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallographic orientation. Offered in odd-numbered years.

220. Mechanics of Geologic Structures (3) II. Twiss Lecture—2 hours; seminar—1 hour. Prerequisite: course 162 or consent of instructor and course 105. Application of principles of continuum mechanics to understanding development of geologic structures such as folds, fractures, faults, diapirs, and domes. Boudinage. Offered in even-numbered years.

226. Advanced Sedimentation and Sedimentary Petrology (4) III. Twiss Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124 or consent of instructor. Advanced petrographic and stratigraphic study of major sedimentary rock suites. Lecture emphasis on recognition and interpretation of the spatial as well as temporal variations in sedimentary rock textures and minerals. Laboratory focus on provenance and diagenesis. Subjects vary yearly. May be repeated for credit. Offered in even-numbered years.

228. Marine Geology (3) II. Margolis Lecture—3 hours. Prerequisite: courses 106, 116, 150B or 165, or consent of instructor. Critical discussions and review of selected topics in marine geology such as paleoceanography, bioturbation of the ocean floor, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated for credit.

235. Advanced Mineralogy (3) III. Holmeister Lecture—3 hours. Prerequisite: course 60 or the equivalent; undergraduate background in petrology. Crystallography and crystal chemistry of the major rock forming minerals. Principles of mineral behavior. Offered in even-numbered years.

231. Mineral Physics Seminar (3) II. Holmeister 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. Offered in even-numbered years.

236. Inverse Theory in Geology and Geophysics (3) III. McClain Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Kalman—Gibson inversion. Offered in even-numbered years.

238. Theoretical Seismology (3) III. McClain Lecture—3 hours. Prerequisite: consent of instructor. Elastic wave equations, Green's functions and source representations. Wave theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media (PINP grading only.) Offered in odd-numbered years.

240. Geophysics of the Earth (3) III. McClain Lecture—3 hours. Prerequisite: Earth Sciences and
German

(College of Letters and Science)

Ph.D., Philosophy of the Department Office (German and Russian), 416 Sproul Hall (916-752-2114)

Faculty
Carrie Asman, Ph.D., Assistant Professor
Wilbur A. Berneke, Ph.D., Associate Professor
Clifford A. Berndt, Ph.D., Professor
Dexter Boncham, Ph.D., Visiting Professor
John F. Finney, Ph.D., Professor
Gail Finney, Ph.D., Professor
Ingeborg Henderson, Ph.D., Senior Lecturer
Ralph W. Hoermann, Ph.D., Professor
Lewis Jilinski, Ph.D., Visiting Professor
Karina B. Keys, Ph.D., Associate Professor
Fritz Sammen-Frankenegg, Ph.D., Lecturer
Peter M. Schieffel, Ph.D., Professor
Helmut Schneider, Ph.D., Professor

The Major Program
The major explores in depth the literature, language, and culture of the German-speaking world. The program is designed to accommodate both students whose interest lies in literary or linguistic studies, as well as those who wish to obtain a broad-based knowledge of the contributions of the German-speaking world to fields such as music, art, history, philosophy, economics, etc. Accordingly, the Department offers a major with three tracks: (a) Literature; (b) Language; (c) German Area Studies. The Department's primary emphasis on literary periods, movements, and themes is reflected in the solid core of upper-division courses that form an integral component of each track. Completion of the major will prepare the student for graduate study in German. All three tracks prepare students for career opportunities in fields such as international relations, business, the sciences, and the arts.

A.B. Major Requirements:

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Three courses chosen from upper division literature courses that are taught in German.

History 144
Four elective courses in accordance with student's interest.

Social Sciences: Economics 174, Geography 123, Political Science 117, 137.

Fine Arts: Art 176C, 177A, 177B, Music 110A, 110C, 110D.

Special consideration also given to such courses in Comparative Literature, and the 164 series, where pan-European movements influence German literature at issue.

German Language Emphasis

German 101, 102, 103, 104

Three courses chosen from upper division literature courses that are taught in German.

German 120

German 104A, 104B

Three courses selected from German 105, 106, 107, 108, 109A, 109B.

Recommended: Linguistics 1

Total Units for the Major: 44-70

Minor Program Requirements:
The Department offers a German Language minor and a German Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate adviser.

Students are particularly encouraged to consider a minor that combines a coherent group of courses to emphasize area studies in German (i.e., German philosophy, the arts, history, political science, as well as literature). The purpose of the minor is to provide students with the opportunity to augment their training in other fields by acquiring proficiency in the German language and exposure to German literature and culture.
4. Intermediate German (4) I, II, III. Henderson in charge. Recitation—3 hours. Prerequisite: course 3. Course 4 may be taken concurrently with 6A or 6B. Review of grammatical principles by means of written exercises; expanding vocabulary through readings of modern German. 

6A. Spoken German (2) I, II, III. Henderson in charge. Discussion—2 hours. Prerequisite: course 3. Courses 4 and 6B may be taken concurrently with or subsequent to 6A. Conversational practice based on everyday vocabulary of modern spoken German. (P/NP grading only.)

6B. Spoken German (2) I, II, III. Henderson in charge. Discussion—2 hours. Prerequisite: course 3. Courses 4 and 6A may be taken concurrently with 6B. Conversational practice based on everyday vocabulary of modern spoken German. Topics vary from course to course. (P/NP grading only.)

10. Basic Reading German (4). The Staff. Discussion—3 hours; translation project—1 hour. Intensive course for non-majors to provide reading proficiency with texts containing basic sentence patterns and standard general vocabulary. Completion of three-course sequence, 10 and one segment each of 11 (H, N, or S) and 12 (H, N, or S), satisfies College of Letters and Science foreign language requirement. Students who have successfully completed the second or more advanced year of high school level course work in the 10th or higher grade may receive unit credit for this course on a P/NP grading basis only.

11H, 11N, 11S. Reading German (4). I, II. The Staff. Lecture—1 hour; discussion—2 hours; translation project—1 hour. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10, with specialized focus for upper division and graduate students in arts and humanities (11H), natural sciences (11N), or social sciences (11S). Reading selections will be appropriately representative. (P/NP grading only.)

12H, 12N, 12S. Advanced Reading German (4). I, II. The Staff. Lecture—1 hour; discussion—2 hours; translation project—1 hour. Prerequisite: successful completion of course 11H, 11N, or 11S. Continuation of course 11H, 11N, or 11S with specialized focus on more advanced texts. Outside reading and translation projects in texts of specialized content to constitute the central element of the course. (P/NP grading only.)

48. Myth and Saga in the Germanic Cultures (4). Hoermann. Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Norse Eddas, the Volsung and Sigurd-Steghild cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "fortal art-work" concept and "The Ring of the Nibelungs" cycle. May not be counted toward major in German. General education credit: Civilization and Culture/Introductory.

50. Survey of German Culture (3). I, II. Arman. Lecture—3 hours; term paper. 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 trends in arts and literature.

51. Introduction to Literary Analysis (4). Menges. Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Introductory study of various genres of German literature with emphasis on the relationship between form and content and the impact on contemporary literary appreciation.

52. Masterworks of German Literature in English Translation (4). I. Fitzer, Finney. Lecture—3 hours; papers. Representative masterworks in English translation, beginning with the baroque period of the seventeenth century (treating genres such as the novel, ballads, fairy tale, lyric poetry) through the modern epoch. Lectures cover background information on periods, authors, and criticism. General Education credit: Civilization and Culture/Introductory.

98. Directed Group Study (1-5). I, II. 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. The Staff. Chairperson in charge. (P/NP grading only.)

Upper Division Courses

100A. Advanced German Conversation (2). I, II. Bernd. Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100B. Advanced German Conversation (2). II. Asman. Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2). III. Menger. 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 the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

104A. Translation (4). I. Jillings. Discussion—3 hours; written reports. Prerequisite: course 102 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

104B. Advanced Translation (4). I, II. Jillings. Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German/English translation of literary and non-literary texts.

105. German Phonology-Morphology (4). I. Bernwar. Discussion—3 hours; written or oral report. Prerequisite: course 4; Linguistics 1 recommended. Modern German phonetics and the structure of the phonological system. Elementory morphological analysis.

106. History of the German Language (4). II. Bernwar. Discussion—3 hours; written reports. Prerequisite: course 102; course 105 or Linguistics 1 recommended. Survey of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4). III. Bernwar. Discussion—3 hours; term paper. Prerequisite: course 104A or the equivalent. Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

108. Varieties of Contemporary German (4). III. Bernwar. Lecture—3 hours; laboratory and/or individual group consultation on projects. Prerequisite: courses 102, 105. Study of relations between Standard language, Umdaschopen and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the
contiguous German-speaking area of Europe.

109A. Business German (4) II. Henderson Lecture-discussion; course 101 or consent of instructor. Specialized advanced language course using business-oriented information and publications as the basis for discussions, role plays, reports, compositions and translations.

109B. Advanced Business German (3) III. Henderson Lecture—3 hours. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as a sequel to German 109A. Expands on previously introduced materials and features new topics of interest such as management, computers, and business law.

110. Older German Literature in English (4) I. McCollum Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Analyses in English of German literature from the Middle Ages through the Reformation (Nibelungenlied, Gottfried’s Tristan und Isolde or Wolfram’s Parzival, lyric poetry, selections from Johann von Tepf, Conrad Celtes, Sebastian Brant, Erasmus, Luther). General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

111. Studies of Major Writers from the Seventeenth to the Twentieth Century (in English) (4) III. Asmann Lecture—3 hours; discussion—1 hour; prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Study of principal works in English translation by one or more major authors such as Grimmshausen, Lessing, Schiller, Goethe, Heine, Büchner, Hauptmann, Thomas Mann, Brecht, and Kafka. Content will vary each time course is offered.

111G. Studies in Major Writers from the 17th to the 20th Century (4) I. Schaeffer Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Principal works by one or more major authors such as Grimmshausen, Lessing, Schiller, Goethe, Heine, Büchner, Hauptmann, Thomas Mann, Brecht, and Kafka. Content will vary each time course is offered. Readings, lectures, discussions in German. May be repeated for credit.

112. Special Topics in German Literature (4) II. The Staff Discussion—3 hours; written reports. Knowledge of German not required. Analysis of significant themes in German literature; women in literature; the image of America; myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature.

112G. Special Topics in German Literature (4) II. Schneider Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Analysis of significant themes in German literature: women in literature; the image of America; myths, legends, fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature.

113. Goethe’s Faust (3) II. Berndt Discussion—3 hours; term paper. Intensive study of one of the great works of world literature: Parts I and II. Discussions and readings in English; reading the text in the original is encouraged. General Education credit: Civilization and Culture/Non-Introductory.

114. The Faust Tradition Before and After Goethe (4) I. Fetzner Lecture—3 hours; term paper. Examines predecessors of Goethe’s Faust (the German chivalric novel of 1587, Titubaldi’s Tragedy of the Franks of 1592), and some successors (Mann’s novel of 1947) in order to underscore key features of this provocative and pervasive theme. Knowledge of German not required.

115A. German Literature since 1945 (4). Menges Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading of major writ-

ers including the post-war generation of Austria, Switzerland and West Germany. Discussion of novelists like Kleist, Grass, Johnson, Waaler, Hanek; playwrights such as Frisch, Dürrenmatt and Hochhuth; and poets like Celan, Enzensberger, and Aichinger. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C.

115B. German Literature since 1945 (4) II. Schaeffer 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 socialist world, the practice of this literature as exemplified in the works of such authors as Sintmert, Seghers, Wolf, Kant, Hacks.

116. From Goethe’s Werther to Today’s Werthers (4) II. Fetzner Lecture—3 hours; discussion—1 hour; written reports. Prerequisite: course 51 or 52 recommended. Comparison of Germany’s first international bestseller, Goethe’s The Sufferings of Young Werther (1774) with its later counterparts, culminating in Pfen-

117A. The Tristan Tradition: Medieval, Musical, Modern (4) III. Fetzner Lecture—3 hours; term paper. Prerequisite: courses 51, 52, and Music 10 recommended. Three different modes of the Tristan: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wagner (1859) and Thomas Mann’s parodic novella (1903) in their intellectual environment and interrelationship. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: German 52, Comparative Literature 2, or English 3.

117B. The Nibelungen Tradition: Medieval, Musi-
cal and Modern (4) III. Fetzner, McConnell Lecture—3 hours; term paper. Prerequisite: course 51 or 52 or Music 10 recommended. Knowledge of German not required. Three modes of the Nibelungen legend: the medieval epic poem Nibelungenlied, the Scandavian Volsung Saga, Wagner’s music drama Ring of the Nibelungs, and Thomas Mann’s re-creation of the Nibelungen in their intellectual environment.

118A. Fin-de-siècle 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). Austria-Hungary at the end of the 19th century; capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture, philosophy, and psychology; heralding European modernism. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 3 or History 4C. History 147B.

118B. Weimar Culture: Defeat, the Roaring Twen-
ties, 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 1919-33. Offered in even-numbered years. Gener-
al Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 3 or History 4C. History 147B.

119. From German Fiction to German Film (4) II. Fetzner Lecture—3 hours; discussion—1 hour; term paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes, both medium and the positive and negative effects achieved by such transformations.

120. Survey of German Culture (4) III. Felzer Discussion—3 hours; written reports. Prerequisite: courses 51-52 for the equivalent components in such areas of German life as the arts, philosophical thought, social institutions, and political history.

121. The Medieval Period in German Literature (4) I. McCollum Discussion—3 hours; term paper. Prerequisite: course 101. Literary-philosophical profile of the Mittelalterliche Bluteszene in terms of the significant epic, romances, and lyric poetry. Readings in modern translation.

122. German Literature from Humanism to Baroque (4) I. Schaeffer Lecture—3 hours; written reports. Prerequisite: course 101. Exemplary literary works of the sixteenth and seventeenth centuries tracing the principal lines of development and showing the reflection in literature of the social scene.

123. Literature of the Classical Age (4) I. Schneider Discussion—3 hours; written or oral reports. Prerequisite: course 101. A critical assessment of principal works of Goethe and Schiller in their development from Sturm und Drang individualism and rebellion to the Later Romantische period.

125. Short Fiction Around 1900 (4) II. Schaeffer Lecture—3 hours; term paper. Prerequisite: course 101. Representative short German fiction in the fin-de-siècle period, to attain concurrence with various prose styles and the last confidence.

126. Modern German Literature (4) II. Menges Discussion—3 hours; written reports. Prerequisite: course 101. Selections from the significant works of major nineteenth-century writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Stefan, and Schwager.

131. German Lyric Poetry (4) III. Schneider Lecture—3 hours; term paper. Prerequisite: course 101. Study of the genre of lyric poetry from late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period.

132. The German Novelle (4) I. Berndt Lecture—3 hours; written reports. Prerequisite: course 101. Inquiry into the art of the "Novelle" through analysis of the materials and format devices of representative authors from Goethe to Kafka.

133. The German Drama (4) III. Fetzner Lecture—3 hours; written reports. Prerequisite: course 101. Readings in the works of Germany’s leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht.

140. German Political Literature from the Middle Ages to the Present (4) II. McConnell Lecture—3 hours; discussion—1 hour. Prerequisite: English 3 or 4, or French 25; course 51 recommended. Examination of the relationship of art to politics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformation, the period of Romanticism, and the Twentieth Century. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3 or 4. Offered in even-numbered years.

192. Field Work in German (1-12) I, II, III. Henderson Internships—3-36 hours; course 103A. Internship with several German companies. Participation in various business activities where expertise in German is expected and further developed. (P/NP grade only.)

194H. Special Study for Honors Students (5) I, II, III. The Staff
Prerequisite: open only to honors students. Guided research leading to an honors paper.

197T. 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 opportunities under guidance of staff after initial observation period. Explores communicative aspects of language teaching; instant feedback and discussion. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

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; 18th and 19th centuries, 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 (1000 to present), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only)

202. Middle High German (4) II. Benware Discussion—3 hours; lecture—1 hour. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.

208. Literary Stylestica (4) I. Schaeffer Seminar—3 hours; written reports. History and meanings of style; levels of diction; analysis of current literary and critical styles. Practice in writing book reviews, articles, lectures, and other papers.

210. Techniques of Literary Scholarship (4) I. Felzer Seminar—3 hours; term paper. The bibliographical, organizational, and methodological tools and resources of the field, independent research.

211. Concepts in Literary Theory (4) II. Schneider Seminar—3 hours; written reports. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German.

212. Contemporary Approaches to Literary Theory (4) III. Trwen 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. Bernd Seminar—3 hours; term paper. The development of German verse, from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor.

241. The German Drama (4) I. Finney Seminar—3 hours; term paper. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.

242. The German Novelle (4) II. Bernd Seminar—3 hours; term paper. The major German Novelisten, 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.

252. The Writings of Lessing (4) I. Sammen-Frankenegg Seminar—3 hours; term paper. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on the German tradtional epic literature.

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.

257. Heinrich von Kleist (4) III. Bernd Seminar—3 hours; term paper. Kleist's important dramatic and prose works; special attention will be given to the problems of expressionist literature 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, on novelistic style, on the social and political background of the novels, and on the role of the art of the novel in modern society.

259. Studies in Kafka (4) I. Hoermann Seminar—3 hours; term paper. Study of Kafka's narrative techniques with emphasis on the short story and its development from its roots in expressionism.

260. The Poetry of Rilke (4) I. Menges Seminar—3 hours; term paper. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke.

261. Brecht and the Epic Theatre (4) III. Menges Seminar—3 hours; term paper. A reading of Brecht's works with emphasis on the areas which impelled the development of new literary forms and concepts.

270. Research in a Period or Topic (4) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; term paper. Individually guided research, under the supervision of a faculty member, in the specialized study of a period or problem that holds promise of yielding dissertation topics, culminating in a term paper. Recommended for Ph.D. candidates prior to the Qualifying Examination.

270B. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge) Individual instruction from a faculty member—1 hour. Prerequisite: course 270A. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliographic references) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

270C. Basic Research for the Dissertation (4) I, II, III. The Staff (Chairperson in charge) Individual instruction from a faculty member—1 hour. Prerequisite: course 270B. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliographic references) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

285. Middle High German Literature (4) III. Jilgings Seminar—3 hours; term paper. Prerequisite: course 220C or consent of instructor. Extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems. May be repeated for credit with subject matter consent of instructor.

286. The Renaissance and Reformation in German Literature (4) I. Schaefler Seminar—3 hours; term paper. The parobolic 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. Schaefler Seminar—3 hours; term paper. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

290. The Enlightenment in German Literature (4) I. Borchardt Seminar—3 hours; term paper. Rovolt against the concept of the "Elegantiaideal," and evolution of a new literature based on reason and will. May be repeated for credit with consent of instructor.

292. Sentimentality and "Sturm und Drang" in German Literature (4) III. The Staff Seminar—3 hours; written reports. Reaction to censorship and protests for reason: theory 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. The Staff Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.

294. The Romantic Period in German Literature (4) III. Fechter Seminar—3 hours; term paper. Survey of the works of early-nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

295. Poetic Realism in German Literature (4) I. Bernd Seminar—3 hours; term paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor.

296. Twentieth-Century German Literature (4) I. Kuhn Seminar—3 hours; term paper. Considers the revolt of the Hauptmann generation, symbolism, expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4) I, II, III. The Staff Seminar—3 hours; term paper. Various special topics in German literature, which may cut across the more usual period and genre rubrics. May be repeated for credit when topic differs.

299. 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)

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

Professional Courses

300. 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)

300B. 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 the practical application. Required of new teaching assistants. (SU grading only)

300C. 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

NOTE: For key to footnote symbols, see page 133.
practical application. Required of new teaching assistants. (SU grading only.)

**400. Tutorial and Instructional Internship (1-3) I, II, III. The Staff (Chairperson in charge).**

**Discussion—1–3 hours. Prerequisite: graduate standing.** 

Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; internship leadership of discussion sections under staff supervision. 

May be repeated for credit.

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**Greek**

See Classics

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**Hebrew**

See Religious Studies

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**History**

( College of Letters and Science)

Roland Marchand, Ph.D., Chairperson of the

Department

Department Office, 176 Voorhees Hall (916-752-0776)

**Faculty**

Arnold J. Bauer, Ph.D., Professor

William B. Brewey, Ph.D., Professor

Cynthia L. Brantley, Ph.D., Associate Professor

David Brody, Ph.D., Professor

Daniel R. Brower, Jr., Ph.D., Professor

Daniel H. Cahoon, Ph.D., Professor

Robert O. Crumley, Ph.D., Professor

Paula E. Findlen, Ph.D., Assistant Professor

Manfred F. Fleischer, Ph.D., Professor

Paul Goodman, Ph.D., Professor

William W. Hagen, Ph.D., Professor

W. Turrentine Jackson, Ph.D., Professor Emeritus

David L. Jacobsohn, Ph.D., Professor

Phyllis G. Justiscia, Ph.D., Assistant Professor

Earl H. Kimbrough, Ph.D., Professor

Catherine J. Kudlack, Ph.D., Assistant Professor

Norma B. Landau, Ph.D., Professor

Karen A. Lane, Professor Emeritus

Eugene P. Linn, Ph.D., Professor

Susan L. Mann, Ph.D., Professor

R. Roland Marchand, Ph.D., Professor

Ted W. Margadant, Ph.D., Professor

Barbara Metcalf, Ph.D., Professor

Rolf E. Poppino, Ph.D., Professor

Don C. Price, Ph.D., Professor

Ruth E. Rosen, Ph.D., Professor

Morton Rothstein, Ph.D., Professor

Vicki L. Ruiz, Ph.D., Associate Professor

Richard N. Schwab, Ph.D., Professor

Morgan B. Sherwood, Ph.D., Professor

James H. Shideer, Ph.D., Professor Emeritus

Michael Smith, Ph.D., Associate Professor

Wilson Smith, Ph.D., Professor Emeritus

Stylianos Spyridakis, Ph.D., Professor

E. Walker, Ph.D., Professor

F. Roy Willis, Ph.D., Professor

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**The Major Program**

This major is designed to develop critical intelligence and to foster an understanding of ourselves and our world through the study of the past—both remote and recent. The Department offers a variety of approaches to history, each emphasizing basic disciplinary skills: weighing evidence, analyzing histori-
cal problems, and presenting conclusions with clarity and logic. The Division thus can give basic support to the education of all undergraduates, whatever their major.

History is also a practical major if one is considering a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A student electing a major in History may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly on the history of one geographic area or time period of their choosing. The purpose of Plan II is to encourage interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of history as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II.

The purpose of Plan III is to enable students to study in depth the field of twentieth-century history, whose common problems of political conflict, social development, and cultural creativity cut across the several geographical fields of concentration which the department now offers.

**A.B. Major Requirements:**

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**Preparatory Subject Matter**

**(Plan I, II, and III)**

Five lower division courses, including at least two from each of the following two fields:

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**a. Western Civilization:** History 41A, 48, 49, 10, 30

**b. Asian Civilization:** History 6, 9A, 9B, 90

**c. United States and Latin America:** History 17A, 17B, 17C, 22, 72A, 72B, 65, 66

**d. Africa:** History 15

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**Depth Subject Matter—Plan I**

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At least six upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses.

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**a. Western Civilization:** History 41B, 48B, 49B, 10B, 30B, 30C

**b. Asian Civilization:** History 6A, 9A, 9B, 90A

**c. United States and Latin America:** History 17A, 17B, 17C, 22, 72A, 72B, 65, 66

**d. Africa:** History 15

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**Total Units for the Major, Plan I:**

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**Depth Subject Matter—Plan II**

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At least four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses.

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**a. Western Civilization:** History 41B, 48B, 49B, 10B, 30B, 30C

**b. Asian Civilization:** History 6A, 9A, 9B, 90A

**c. United States and Latin America:** History 17A, 17B, 17C, 22, 72A, 72B, 65, 66

**d. Africa:** History 15

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**Total Units for the Major, Plan II:**

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**Depth Subject Matter—Plan III**

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At least three upper division courses from the following list of twentieth-century courses, classified by area of concentration. At least one course must be from category A. History 169A, 146B, 146B, 174C

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**Total Units for the Major, Plan III:**

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**NOTE:** For key to footnote symbols, see page 133.

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**Fields of Concentration**

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**d. African History:** History 102O, 115A, 115B, 115C, 116

**e. Latin American History:** History 102J, 161A, 161B, 162, 163A, 165B, 166A, 166B, 169A, 169B

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**Recommended**

Completion of all three courses in Western Civilization (i.e., History 4A, 4B, 4C) and one or two courses (normally a two-quarter sequence) in each of the following fields: Asian American studies, classics, cultural anthropology, cultural geography, principles of economics, English language, the literature of the United States, philosophy, political science, psychology, sociology, or statistics.

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**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.
History 267

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) — twenty units chosen from History 151A, 151B, 151C, 170B, 180A, 180B, 180C, 102I or 102Q, with approval of advisor.


Minor Advisers. Same as for major advisers.

Honors and Honors Program. A student may become eligible for graduation with high or highest honors by meeting the minimum grade-point average and course work requirements established by the College of Letters and Science and by demonstrating unusually imaginative or creative work in history (see the College of Letters and Science section of this catalog). Such creative work may be demonstrated in various ways: in undergraduate seminars, in independent study, in special projects, or by distinguishing work in Plan II of the major program. Departmental recommendation, based on clear evidence of distinction and originality, is a prerequisite for the awarding of high or highest honors.

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 consists of 45 course units, including courses 17A and 17B, two lower division courses in Western Civilization (1, 3, 4, 4A, 4B, 4C) of which one must be 3 or 4C, one undergraduate seminar (course 101 or 102), and six additional courses, of which four must be at the upper division level. Successful completion of this program will allow the student to receive a waiver from examinations for the History Single-Subject Teaching Credential.

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 selected for participation 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 three courses in the Department of History: 157, 158, and 159. Special arrangements for additional independent study (maximum of 4 units) 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: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174D, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 179, 180A, 180C, 183A, 183B. The upper division courses may be used only with the consent of the instructor. See also under University requirements.)

Courses in History

Lower Division Courses

1. The Bible and Ancient History (4)

- Schwab Lecture 3 hours; discussion 1 hour. Examination of the Judaeo-Christian tradition as it met ancient Near Eastern and classical ideas and instructions through New Testament times. Emphasis on the Bible as a historical document and on historical-critical interpretation of scriptures.

2. Ancient Civilizations (4)

- Fleischer Lecture 3 hours; discussion 1 hour. Growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.

3. Cities: A Survey of Western Civilization (4)


4A. History of Western Civilization (4)

- II. The Staff (Chairperson in charge) Lecture 3 hours; discussion 1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4B. History of Western Civilization (4)

- II. The Staff (Chairperson in charge) Lecture 3 hours; discussion 1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

4C. History of Western Civilization (4)

- III. The Staff (Chairperson in charge) Lecture 3 hours; discussion 1 hour. Development of western civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

8. History of Indian Civilization (4)

- 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 political organization, and art and literature that reflect cultural interaction and change. General Education credit: Civilization and Culture/Introductory.

9A. History of East Asian Civilization (4)

- 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/Introductory.

9B. History of East Asian Civilization (4)

- II. Kinmonth 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)

- 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, Nehru, Nasser, Castro). General Education credit: Contemporary Societies/Introductory.

15. Introduction to African History (4)

- L. Brantley Lecture 3 hours; term paper. Examination of the deep development of African civilizations through the twelfth-century colonization by Europeans.

17A. History of the United States (4)

- II, III. The Staff Lecture 3 hours; discussion 1 hour. Growth of the American people from Colonial times to 1815. General Education credit: Civilization and Culture/Introductory.

17B. History of the United States (4)

- II, III. The Staff Lecture 3 hours; discussion 1 hour. Growth of the American people from 1815 to 1915. General Education credit: Civilization and Culture/Introductory.

17C. History of the United States (4)

- III. The Staff Lecture 3 hours; discussion 1 hour. Growth of the American people from 1915 to the present.

22. Violence and Law in America (4)

- C. Halloun Lecture 2 hours; discussion 2 hours. Movements of protest or social control from the revolutionary period to the present. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 4C, 17A, 17B, or Political Science 1.

25. Thematic History Seminar (4)

- II. The Staff Seminar 3 hours; term paper. Prerequisite: freshmen or sophomore standing. Explores in-depth a historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretations.

30. Russian Cultural History (4)

- Cumrum 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 current of the country's political, social, and cultural development. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C, 17A, 17B, or Political Science 1.

72A. Social History of American Women and the Family (4)

- R. Rosen Lecture 3 hours; discussion 1 hour. Social and cultural history of women, sex roles, and the family in nineteenth-century America, emphasizing female reformers and reformers, working class women, communism, the role of media, the "feminine mystique," changes in family life, and the emergent women's movement.

72E. Nature, Man, and the Machine in America (4)

- Seminar 4 hours; term paper. Prerequisite: consent of instructor. History of the attitudes and behavior of Americans toward their natural environment and their technological environment, from colonial times to the present. No final exam. Limited enrollment.

86. Quackery and Pseudoscience in America (4)

- Sherwood Lecture 3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in
courses 115A and 115B recommended. Introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1500 to the present.

*116. African History: Special Themes (4) III.
Brantly
Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association.

121A. Medieval History (4) I. Bowsky
Lecture-discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the hundred years war.

121B. Medieval History (4) II. The Staff
Lecture-discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century.

121C. Medieval History (4) III. Bowsky
Lecture-discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance.

122. Selected Themes in Medieval History (4) II.
Bowsky
Lecture—3 hours; term paper. Each offering will focus on single major theme, such as medieval agricultural history, feudalism, the family, medieval Italy, or the Crusades. Letter grades only. Prerequisite: one of English 104 or 104A, or French 104A or 104B, or German 104A or 104B, or Russian 104A or 104B, or Spanish 104A or 104B, or any 100-level course in English translation and modern works. May be repeated for credit.

130A. Christianity and Culture in Europe: 50-1450 (4) I.
Fleischer
Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics, and economics.

130B. Christianity and Culture in Europe: 1450-1600 (4) II.
Fleischer
Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformation as foundation stones of a new culture in Europe, with special attention to the intersections between the revival of antiquity and the different reform movements.

130C. Christianity and Culture in Europe: 1600-1650 (4) III.
Fleischer
Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Thirty Years War. The concept of "Scientific Revolution" will be discussed in the context of the Enlightenment and Romanticism.

131A. Early Modern European History (4) I.
Fleischer
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1350 to about 1500.

131B. Early Modern European History (4) II.
Fleischer
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1550.

131C. Early Modern European History (4) III.
Fleischer
Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131B recommended. Western European history from about 1550 to about 1789.

132. The Scientific Revolution (4) III.
Fleischer
Lecture—3 hours; term paper. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Vesalius, Harvey, Galileo and Newton. Considers the evolution of natural experiments, observation, and scientific theory.

133. The Age of Ideas (4) II.
Schwab
Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century.

134A. The Age of Revolution (4) III. Schwab
Lecture—3 hours; written reports. Ideas and institutions during the French Revolution and the Napoleonic era.

*135A. The Age of Revolution (4) III. Schwab
Lecture—3 hours; written reports. Ideas and revolution after 1815. Offered in odd-numbered semesters.

137A. Russian History: The Empire, 1725-1900 (4) II. Bowker
Lecture—3 hours; term paper. Russian civilization from early times to 1725. Emphasis on the rise of autocracy and the evolution of society and culture.

137B. Russian History: The Empire, 1725-1900 (4) III. Bowker
Lecture—3 hours; term paper. Russian civilization from the Petrine reforms to the end of the nineteenth century. Emphasis on the strengthening and reform of the autocracy, the rise of movements for revolutionary change, and the evolution of society and culture.

137C. Revolutionary and Soviet Russia, 1900 to the Present (4) III. Bowker
Lecture—3 hours; written reports. Evolution of the Russian state and society from the collapse of tsarist Russia through the creation and consolidation of the new Soviet order.

138. History of the Russian Revolution (4) I.
Bowker
Lecture—3 hours; term paper and oral reports. History of the fall of the Russian autocracy and of the Revolution of 1917. Offered in even-numbered years.

140. The Rise of Capitalism in Europe (4) III.
Hagen
Lecture—3 hours; term paper. Prerequisite: course 4B or 4C. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1615; the transition to modern capitalism; via industrial revolution, interplay of social, political, cultural, and economic history. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, or 4C.

141. France Since 1815 (4) II. Margaliant
Lecture—3 hours; term paper.

142. Why the Holocaust? (4) II. Goodman
Lecture—3 hours; term paper. Long- and short-term causes of the Holocaust; the emancipation of European Jewry; the rise of modern anti-Semitism; nationality question in central Europe; antisemitism and German politics; Nazism and mass murder; responses by victims and bystanders.

143. History of Eastern Europe and the Balkans (4) II.
Hagen
Lecture—3 hours; essay. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. Nationalist cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1798-1914; the twentieth century, including an analysis of the contemporary scene.

144. History of Germany since 1648 (4) II.
Hagen
Lecture—3 hours; essays. Social and political history of Germany in the ages of absolutism and the Enlightenment, industrialization, nationalism, unification, the World Wars, and since 1945.

145. War and Revolution in Europe, 1789-1918 (4) III.
Margaliant
Lecture—3 hours; term paper. Survey of revolution ary movements, international crises, and wars in Europe from the French Revolution to World War I.

146A. Europe in the Twentieth Century (4) I. Willis
Lecture—3 hours; term paper. Survey of the History of Europe from 1919 to 1939.

146B. Europe in the Twentieth Century (4) II. Willis
Lecture—3 hours; term paper. Survey of the History of Europe since 1939.

147A. European Intellectual History, 1800-1870 (4) I.
Lunn
Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks,

NOTE: For key to footnote symbols, see page 133.
from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of George, J.S. Mill, and Darwin and Proudhon. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C or Philosophy 151.


147C. European Intellectual History, 1920-1970 (4 II). Lunn 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, Satre, Camus, Beckett, Marcus, Foucault, Woff, and de Beauvoir. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C.


149B. Women in Industrial Societies: A Comparative Historical Approach (4 III). Goodman Lecture—4 hours. Comparative analysis of the development of labor parties and socialist movements in Britain, France, Germany and their failure in the United States in the early twentieth century. Political cultures, social structures, and historical experiences shaping working-class politics.

150. Ethnic Conflict and Anti-Semitism in Modern Europe (4 I). Hage Lecture—3 hours; term paper. Prerequisite: course 4C. Historical dynamics of ethnic conflict and radical nationalism in nineteenth- and twentieth-century Europe. Focusing on selected examples (e.g., the Habsburg Empire; the Celtic lands; forms and functions of anti-Semitism; interpretations and consequences of the Holocaust). Offered in even-numbered years.

151A. England: The Middle Ages (4 II). The Staff Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wycliff.

151B. England: The Early Modern Centuries (4 II). The Staff Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B; course 151A recommended. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton.

151C. Eighteenth-Century England (4 I). Landa 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 a model environment to fit the emerging 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 continuance of the first industrial nation, examination of the transformation of landed to class society, oligarchy to democracy and bureaucracy. Bentham to Blombury, empire to commonwealth.

151E. Tudor and Stuart England (5 III). Seminer—3 hours; reports and research paper. Prerequisite: courses 151A, 151B and/or consent of instructor. Intensive investigation of selected aspects of Tudor and Stuart history; emphasis on social problems and the arts and learning.

155A. British Foreign Policy Since 1820: The End of the British Empire (4 I). Freeman Lecture—3 hours; term paper. Prerequisite: upper division standing. How and why Britain passed so rapidly and by constitutional process from being the greatest imperial power in history to non-imperial, middle-class status; the background against which the global responsibilities of the U.S. developed with equal rapidity.

155B. British Foreign Policy Since 1820: Britain's Relations with the U.S. and the U.S.S.R. (4 II). Freeman Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's supposedly intimate relationship with the U.S.; its modification with changes in power-structure and with Britain's EEC membership; the effect on relations with the U.S. of Britain's (and other Nato powers) efforts to achieve independent relations with the U.S.S.R.

155C. British Foreign Policy Since 1820: Britain (4). Smith Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's attempts after 1920 to replace the European balance of power with collective security and then, after World War II, with British hegemony in Europe. Britain's final, contentious entry to the EEC and its consequences for western Europe.

161A. Latin American History (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/Introductory.

161B. Latin American History (4 II). Bauer Lecture-discussion—3 hours; written reports. Evolution of contemporary Latin American societies; 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). Bauer Lecture-discussion—3 hours; written and/or oral reports. History of the Andean area, the region that now comprises modern Peru, Bolivia, and Chile, from the beginning of Spanish settlement to the present.

163A. History of Brazil (4 III). Poppino Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in odd-numbered years.

163B. History of Brazil (4 III). Poppino Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in even-numbered years.

164. History of Chile (4 II). Bauer Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, 165, or 166 recommended. Emphasis on the history of Chilean political economy from 1900 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. Offered in odd-numbered years.


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 even-numbered 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 odd-numbered years.

168. History of Inter-American Relations (4 II). Poppino 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). Ruiz Lecture-discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Hispanic-speaking population of the southwestern United States from about 1800 to 1910. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

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/Non-Introductory. Recommended GE preparation: History 17B.

170A. Colonial America (4 I). 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 II). 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). Calhoun Lecture—3 hours. Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850.


172A. North America: Early Imperial Wars (4 II). Calhoun Lecture—3 hours; paper with scheduled consulta- tion. European conquests, Native American resistance, early colonial history, the Spanish-American War, the Spanish-American War, and the Spanish-American War. Tactical styles of various peoples, conditions of effectiveness and failure, and the relation of strategy to social development and conflict. Offered in even-numbered years.

172B. North America: Wars of National Expansion and Conservative Resistance (4 I). Calhoun Lecture—3 hours; paper with scheduled consulta-
social and cultural forces in American society from colonial times through the Cold War. Its chapters cover such issues as social structure, immigration and nativism, racial and occupational groups, social reform movements and changes in social values.

177B. Social and Cultural History of the United States (4) [III]. Rosen
Lecture-discussion—3 hours; term paper and written or oral report. Study of social and cultural forces in American society since the Civil War with emphasis on social structure, immigration, urbanization, labor organizations, racial and national groups, social reform movements and changes in social values.

177A. History of Black People and American Race Relations (4) [II]. Walker
Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from African background to Reconstruction. General Education credit. Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

178B. History of Black People and American Race Relations (4) [II]. Walker
Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from Reconstruction to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

178A. American Colleges and Universities (4) [II]. W. Smith
Lecture—3 hours; term paper. A survey of American higher education from the late 18th century to the present emphasizing institutional intellectual life and the role of colleges and universities in their larger society. Tutored term paper; readings of general interest. Offered in even-numbered years.

179A. The Working Class in American Society (4) [II]. Brody
Lecture—3 hours; written reports. Prerequisite: course 17B recommended. American labor from the mid-nineteenth century to the present. Social, economic and political forces. Trade unionism and radical movements. Offered in even-numbered years.

180A. Growth of American Politics to 1615 (4) [I]. Goodman
Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to 1615 focusing on the distribution of power, its change over time and the ways power has been exercised to determine political party development and the social and ideological dimensions of political behavior.

180B. Growth of American Politics, 1615-1800 (4) [II, III]. Goodman
Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

180C. Growth of American Politics, 1800 to the Present (4) [III]. Goodman
Lecture—3 hours; reading and supervised writing. Continuation of course 180B.

181. Religion in American History to 1900 (4) [III]. Jacobson
Lecture—2 hours; discussion—1 hour, oral and written reports. Religious ideas and institutions from the Puritans to about 1900. Survey of the large-scale social changes associated with revivalism and the great awakenings and the movement from Protestant orthodoxy to pluralism in the United States.

182A. The Frontier Experience: Trans-Mississippian West (4) [II]. The Staff
Lecture—3 hours; written and/or oral reports. The fur trade, westward expansion and transportation, the Oregon Country, the Great Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War.

183B. The Frontier Experience: Trans-Mississippian West (4) [II]. The Staff
Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

185A. History of Science in America (4) [II]. Sherwood
Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present.

185B. History of Technology in America (4) [III]. Sherwood
Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present.

187A. American Business History to the 1860s (4) [I]. Robotham
Lecture—3 hours; term papers. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1860s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in even-numbered years.

187B. American Business History, 1860s to the Present (4) [II]. Robotham
Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1860s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, financial intermediaries, and concentration. Offered in odd-numbered years.

188A. History of Agriculture in the U.S. to 1900 (4) [II]. Robotham
Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economic and social institutions. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A, 17B, or Agrarian Studies 2.

188B. History of Agriculture in the U.S. since 1900 (4) [II]. Robotham
Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A, 17B, or Agrarian Studies 2.

189A. History of California (4) [I]. M. Smith
Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War.

189B. History of California (4) [II]. M. Smith
Lecture—3 hours; written and/or oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilantes; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform.

189C. History of California (4) [II]. M. Smith
Lecture—3 hours; written and/or oral reports. Impact of World War I; conservative reaction of the 1920s; rise of organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics.

190A. Late Imperial China: Background to Revolu-

tion (4) [II]. Liu
Lecture—2 hours; discussion—1 hour, term paper. Functions and problems of Chinese life traced through the Ming and Ch'ing dynasties. Readings include literary materials in English translation (particularly novels) which reflect the social and intellectual scene, the elite ethos as well as popular culture. Offered in even-numbered years.
196B. Late Imperial China: Background to Revolution (4) II. Lu Lecture—2 hours; discussion—1 hour; term paper. Internal and external pressures in China from the early to middle nineteenth century. Emphasis on the impact of the West and the beginnings of revolutionary change. Offered in odd-numbered years.


191A. Classical China (4) II. Price Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the First Empire.

191B. High Imperial China (4) III. Price Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of Tang, Sung, and Ming with analysis of society, culture and thought.

192. Internship in History (2-5,1) II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.)

193. History of the People's Republic of China, 1949 to the Present (4) I. Liu Lecture—2 hours; discussion—1 hour; term paper. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and China's foreign relations from 1949 to the present. Offered in even-numbered years.

194A. Aristocratic and Feudal Japan (4) I. Kinmonth Lecture—3 hours; term paper and/or discussion. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. Offered in odd-numbered years.

194B. Early Modern Japan (4) III. Kinmonth Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism.

194C. Modern Japan (4) II. Kinmonth Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power.

194D. Business and Labor in Modern Japan (4) I. Kinmonth Lecture—3 hours; term paper or papers. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in even-numbered years.

194E. Education and Technology in Modern Japan (4) I. Kinmonth Lecture—3 hours; term papers. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in odd-numbered years.

195. Modern China and the West (4) I. Lu Lecture—2 hours; discussion—1 hour; term paper. Historical, social, and cultural relations between China, political, cultural, and economic, in the context of East Asian international relations and emphasizing the twentieth century. Offered in odd-numbered years.

196A. Medieval India (4) I. Metcalf Lecture—3 hours; discussion—1 hour; written reports. Survey of history of India in the millennium preceding arrival of the British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the state.

196B. Modern India (4) I. Metcalf Lecture—3 hours; discussion—1 hour; written reports. Survey of cultural, social, economic, and political aspects of South Asian history from the arrival of the British in the eighteenth century to formation of new independent states—India, Bangladesh, and Pakistan—in the twentieth century.

197T. Tutoring in History (2) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—3 hours. Prerequisite: enrollment as a History major with senior standing and consent of Department Chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated once for credit. No final examination. (P/NP grading only.)

198. Directed Group Study (1-5) I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor; upper division standing. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (4-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

201A-D. Sources and General Literature of History (4) I, II, III. The Staff Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. (A) Ancient; (B) Medieval Europe; (C) Mediaeval; (D) Renaissance and Reformation; (E) Europe since 1815; (F) China to 1800; (G) China since 1800; (H) Britain; (I) Latin America since 1810; (J) American History to 1776; (K) United States, 1776-1796; (L) United States since 1816; (M) Modern Japan. May be repeated for credit when different subject area is studied.

202A-I. Major Issues in Historical Interpretation (4) I, II, III. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. (A) Ancient; (B) Medieval Europe; (C) Mediaeval; (D) India; (E) Africa; (F) China; (G) Japan; (H) United States; (I) Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.

203. Seminar Research (4) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours. Prerequisite: consent of instructor. Designed primarily for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper. May be repeated for credit.

204A. Historiography (4) II. The Staff (Chairperson in charge) Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Introduction to major works of historical scholarship from the Greeks to the present.

204B. New Methods of Historical Research (4) III. The Staff (Chairperson in charge) Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Interdisciplinary seminar emphasizing sociopolitical, economic, and intellectual themes. May be repeated for credit.

204C. Thematic Seminar (4) III. The Staff (Chairperson in charge) Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Interdisciplinary seminar emphasizing sociopolitical, economic, and intellectual themes. May be repeated for credit.

*NOTE: For key to footnote symbols, see page 138.*
Home Economics

College of Agricultural and Environmental Sciences

Program of Study

The Home Economics major is no longer available at UC Davis. If you have begun course work for this major as an enrolled student before spring quarter 1987, you may complete a B.S. degree by following the major requirements as listed in a prior edition of this catalog.

Courses in Home Economics

Lower Division Courses

*90. Challenges and Opportunities in Home Economics (3) I. Seminar—1 hour. Specialists in selected areas of home economics address current issues facing today's professional including challenges, opportunities, and prospects for appropriately trained university graduates. May be repeated once for credit with consent of instructor. (P/NP grading only.) Offered in odd-numbered years.

*92. Internship in Home Economics (1-12) I, II, III. The Staff. Seminar—1 hour. Prerequisite: consent of instructor. Work-learning experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

*192. Internship in Home Economics (1-12) I, II, III. The Staff. Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learning experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (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. Prerequisite: consent of instructor. (P/NP grading only.)

Home Economics Education

See Agricultural and Home Economics Education

Horticulture (A Graduate Group)

Ellen G. Sutter, Ph.D., Chairperson of the Group

Faculty. The faculty includes departmental members of Environmental Horticulture, Pomology, and Viticulture and Enology.

Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree under the two master's degree options: thesis or comprehensive examination.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, plant genetics and introductory plant physiology. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail and may be obtained from the Group Office.

Graduate Advisers. Information relative to advisers available in each of the three departments above may be obtained from the Department of Pomology or the Group Office.

Related Courses. Pertinent graduate courses in horticulture may be found by reviewing the Catalog under the departmental categories of Environmental Horticulture, Pomology, Viticulture and Enology, Plant Science, and Plant Physiology.

Courses in Horticulture

Graduate Courses

251. Modeling Horticultural Systems (3) II. Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 101, calculus, or consent of instructor. Introduces students to systems modeling. Primary emphasis on physiological and ecological models with examples drawn from areas of interest to class participants. Applications to horticultural systems will be explored. Students will receive hands-on experience.

290. Seminar (1) I, II, III. The Staff. Seminar—1 hour. Prerequisite: graduate standing at UCD. Seminars presented by invited speakers, stu-
dents, or faculty on selected topics in horticulture. (S/U grading only.)

Human Development

College of Agricultural and Environmental Sciences

Faculty

See under Department of Applied Behavioral Sciences.

The Major Program

Human Development is an appropriate undergraduate major if you want to explore the developmental process in humans throughout the life cycle. Concentrating on the periods between birth and young adulthood, cognitive and personality/social development are studied from various perspectives. The emphasis is on the interrelationship of the person, the family, and the community. It is an appropriate major for those planning to pursue advanced degrees in the behavioral sciences and offers course work useful for persons who will later pursue careers in education, child guidance, social welfare, health science related fields, or research in human development.

Human Development majors observe infants, children, and adults in a variety of situations. You may also participate in study projects with people from different socioeconomic and cultural backgrounds who function in a variety of institutional settings (schools, hospitals, mental health clinics, and group foster homes).

Students who anticipate exploring the biological aspects of Human Development should include in their preparatory course work the prerequisites for upper division biological sciences courses.

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

UNITS

Written/Oral Expression .................................................. 7-8
Additional English course 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***, 2A** or 101) ......... 4-6
Genetics (Genetics 100 or 100H) ....................................... 4
Human development (Human Development 30) .................. 4
Nutrition (Nutrition 10 or 101) ........................................ 3-5
Physiology (Physiology 101 or 110 or 110C* or Biological Sciences 18)**.. 3-5
Psychology (Psychology 1 or 15) ..................................... 3-4
Statistics (Education 114, Psychology 41, Sociology 46A and 46B, or Statistics 13) .............. 4
* Zoology 10 or Psychology 108 only if Psychology 10 is not offered. (See your faculty adviser if unsure.)
** Chemistry 1A is recommended prerequisite for Biological Sciences 1A.
Biological Sciences 1A is prerequisite for Biological Sciences 1B.
† Taking the entire Biological Sciences 1A, 1B, 1C sequence will satisfy the Biological science, Genetics, and Physiology requirements.

Breadth/General Education ............................................... 14-32
Satisfaction of General Education requirement .......................... 6-24
American history/American government (Political Science) .................. 8
Human Development 273

131. Developmental Disabilities (4) I. Barton
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Materials relating to special learning disabilities, etiology, diagnosis, education, and socialization. Introduction to community resources.

132. Individual Differences in Giftedness (4) III. Kraft
Lecture—3 hours: discussion—1 hour. Prerequisite: courses 100A, 100B, and 140, (may be taken concurrently). Theory and practice in the area of effective interaction with young children. Humanistic, child-centered approaches; awareness of goals, beliefs, and values as these affect interactions. Students may not preenroll for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

140. Laboratory in Early Childhood (3-6) I, II, III. Stockman
Discussion—1 hour. Laboratory—6 to 12 hours. Application of theories of learning and development to interaction with children six months to five years at Early Childhood Laboratory. Applied skills in communicating, discipline and curriculum. May be repeated for credit a total of 12 units.

141. Field Studies with Children and Adolescents (4-6) II, III. The Staff
Discussion—3 hours: field study—6 to 12 hours. Prerequisite: course 100B or consent of instructor. Study of children's effective, cognitive, and social development within the context of family/school environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) I. Bryant
Discussion—1 hour; field study—6 to 12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 (may be taken concurrently). Field study with children who are identified as developmentally disabled, emotionally disordered, 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. Welker
Lecture—4 hours. Topics include: course 140 or prior experience in an early childhood education program. History of early childhood programs in California; federal, state and local regulations. Implications of new regulations for budgets and policy making. Professional and legal responsibilities; staff development and community attitudes.

151. Shared Child Care (4) I. Bryant
Lecture—4 hours. Prerequisite: courses 100A or 110, Psychology 112, or Anthropology 131. Examinations. Family day care providers, foster parents, and employer-sponsored child care in the child's environment. Reviews child care legislation and social policy issues.

159. Social Aspects of Aging (4) II. The Staff
Lecture—4 hours. Prerequisite: course 100C or Psychology 115. Major characteristics, needs, and interests of older people in contemporary America. Emphasis on social problems and community approaches to their solutions.

*190C. Introductory Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: involvement in

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NOTE: For key to footnote symbols, see page 133.
ongoing research. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and assessed. The major areas of cognitive and social aspects of development, are presented and evaluated. May be repeated for credit. (P/NP grading only)

191. Proseminar: Issues in Aging (2) I. The Staff Seminar—2 hours. Prerequisite: upper division standing. Discussion of selected critical issues in aging.

192. Internship (1-7) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship off and on campus, in community, and institutional settings. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson 'n charge) (P/NP grading only)

Graduate Studies

200A. Early Development (4) I. Harper Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology/physiology; one upper division course in psychology or related field; one upper division or graduate course in developmental psychology (to be taken concurrently). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years.

200B. Middle Childhood and Adolescence (4) I, II. Bryant Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology, and at least two upper division or graduate-level courses in psychology or related field. Theory and research on the biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence.

200C. Development in Adulthood (4) I, II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; two upper division or graduate-level courses in psychology or the equivalent. Theory and research on the biological, cognitive, social, and cultural influences on behavioral development from young adulthood to death.

201. Social-Emotional Development in Infancy (4) I. The Staff Lecture-discussion—4 hours. Prerequisite: course 200A. Analysis of theory, methods, and research on social-emotional development in infancy. Emphasis on the development of primary and secondary emotions, and the development of attachment. Other possible topics include infant temperament, sex differences, competence, and self-regulation.

202. Development in Middle Childhood (3) II. Bryant Seminar—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 "abnormal" development in middle childhood. Emphasizes social-emotional development in varying contexts (family, school, neighborhood) and cross-cultural aspects of development. Focuses on family, social, emotional, and moral development during middle childhood. Offered in even-numbered 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 and the inadequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Offered in even-numbered years.

211. Physiological Correlates of Behavioral Development (3) I. Harper Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of factors that serve as the basis for organizational development and the development of children and infant-humans.

213. Cross-Cultural Study of Children (3) III. Werner Lecture—2 hours; discussion—1 hour. Field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology, and Sociology. Current theory and research concerned with cross-cultural differences in children's development. Emphasis on comparative and qualitative research methods. (e.g., biological, cognitive, social, and cultural differences in children's development in different cultures and subcultures in the United States.)

217. Development of Cortical and Perceptual Latency (3) II. Kraft Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Current theory and research on the development of human cortical and perceptual latency. Emphasis on the relationship of this development to thinking and behavior.

220. Research Methods in Human Growth and Development (3) II. The Staff Lecture—3 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through observation, analysis of verbal and nonverbal, 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 (3) I. Poltt Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (related fields) and Nutrition. Multidisciplinary approach covering physiological and psychological aspects of human development processes related to food intake.

226. Issues in Cognitive and Linguistic Development (3) III. The Staff Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

227. Parent-Child Interaction (3) III. The Staff Seminar—3 hours. Prerequisite: consent of instructor. Upper division course on the family. Emphasis on current theory and research. Emphasis on parent behavior in other animals and other cultures, childrearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development.

224. Consultation Approaches to Child Development (3) II. Bryant Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Seminar for experienced 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.

200 Seminar (3) I, II, III. The Staff Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

Humanities

(College of Letters and Science)

James Murphy, Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-1199)

Committee in Charge
Ingeborg Henderson, Ph.D., (German) Robert H. Hopkins, Ph.D., (English) Earl H. Kinmonth, Ph.D., (French) James J. Murphy, Ph.D. (Rhetoric and Communication, English), Chairperson Lynn E. Roper, Ph.D., (Classics)

The Program of Study

Courses in the Humanities Program are designed to provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.

Courses in Humanities

Lower Division Course

40. Introduction to Computing in the Humanities (4) II, Roddy Lecture—3 hours; laboratory—3 hours. Survey of current approaches to use of computers in such fields as language, literature, history, art, music, and drama. Laboratory in text creation and analysis.

Upper Division Courses

101. Advanced Computing in the Humanities (4) III, Roddy Lecture—3 hours; laboratory—3 hours. Research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and database management (design, application, and evaluation, and search strategies).

180. Topics in the Humanities (4) I, II, III. The Staff Lecture-discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics vary; may be repeated once for credit.

198. Directed Group Study (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses

250. Topics in the Humanities (4) I, II, III. The Staff (Program Director 'n charge) Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.

NOTE: For key to footnote symbols, see page 133.
**Immunology (A Graduate Group)**

M. Eric Gershwin, M.D., Chairperson of the Group
Group Office, 3146 Medical Sciences-1A
(916-752-3392)

Faculty. The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Immunology is a multi-disciplinary group offering programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. The Master's degree is offered under the two master's degree options: thesis or comprehensive examination.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, zoology or botany, general bacteriology or microbiology, general genetics, mathematics, general physics, chemistry, and biochemistry.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements more specialized preparation in at least one of the following is required: (a) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (b) zoological specialties (cell biology, endocrinology, embryology, protozoology, histology, cytology, physiology); (c) medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); (d) biochemistry/biophysics specialties (biologically active molecules, control mechanisms); (e) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Advisor. Contact the Group Office.

**Courses in Immunology**

Graduate Course

292. Immunochemistry Seminar (2) L. S. Galab Seminar—2 hours. Prerequisite: graduate standing. Semester presentation dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. Offered in odd-numbered years. (SU grading only.)

296. Investigative Immunology (1) I, II, III. DeNardo Seminar—5 hours. Prerequisite: graduate standing. Presentation, discussion, and analysis of topics in immunological research. (SU grading only.) Additional courses are available and listed under the individual sponsoring departments. Contact the group office for information.

**Individual Major**

(Colleges of Agricultural and Environmental Sciences and Letters and Science)

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisors and appropriate college committees. This major enables a student to pursue a specific field of interest which cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Proposals for individual majors should be submitted before the fourth quarter prior to graduation. Specific requirements for each college are shown below. Application forms are available in program offices.

College of Agricultural and Environmental Sciences

Program Office, 122 Hoagland Hall (916-752-0610)

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**

An individualized program of 45 upper division units taken from two or more areas of study. At least 30 of the 45 units must be taken from courses provided by the College.

**Unrestricted Electives**

Total Units for the Degree—180

Additional requirements

At least 54 of the 180 units needed for graduation must be upper division. The College also requires satisfaction of the General Education Requirement and the Breadth Proficiency in English and/or Rhetoric and Communication courses that emphasize written or oral expression (see College requirements).

**Master Adviser.** C.L. Keen (Nutrition). The course of study must be developed in consultation with the Master Adviser and at least two faculty members prior to final review by the Individual Major Committee for the College.

Incoming transfer students applying for an Individual Major will be admitted into the Exploratory Program.

College of Letters and Science

Program Office, 150 Main Hall (Dean's Office), (916-752-0392)

Committee in Charge

Ed M. Bernauer, Ph.D. (Physical Education)
Robert D. Glass, Ph.D. (Mathematics)
Robert M. Murphy, Ph.D., Chair (Psychology)
Peter M. Schaefler, Ph.D. (German and Russian)

A.B. and B.S. Major Requirement:

**Preparatory Subject Matter**

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

**Depth Subject Matter**

Upper division units must include:

a. interdisciplinary and complementary courses from two or more departments which provide a unified pattern and focus;

b. at least 30 units from Letters and Science teaching departments or programs;

c. no more than 10 units in courses numbered 194H, 198 and 199.

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 professional objectives, and the content of the proposal, as well as letters of recommendations. After initial review, the Faculty Committee on Individual Majors evaluations the proposal and approves 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 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.

Final admission will depend upon the Committee's approval of a senior thesis prospectus. The prospectus must be presented to the Committee during the first quarter of the senior year. Graduation with highest honors will be conditional upon both the completion of the required grade-point average and the completion of the senior thesis project. The Committee will consider alteration of the student's original major proposal to allow up to 3 units of independent study during each of the last two quarters of the senior year for work on senior honors thesis.

**Integrated Studies**

(College of Letters and Science)

Nora A. McGuinness, Ph.D., Program Director
Program Office, 816 Sproul Hall (916-752-3377)

Committee in Charge

Daniel R. Bowker, Jr., Ph.D. (History)
Richard T. Curley, Ph.D. (Anthropology)
Gordon J. Edlin, Ph.D. (Genetics)
Bruce M. Hackett, Ph.D. (Sociology)
Kurt Keating, Ph.D. (Mathematics)
Arthur E. McGuinness, Ph.D. (English)
Nora A. McGuinness, Ph.D. (Integrated Studies)
T. David A. Robertson, Ph.D. (English)
Daniel L. Wick, Ph.D. (Integrated Studies)

Faculty

John B. Boe, Ph.D., Lecturer (English)
Thomas A. Cahill, Ph.D., Professor (Physics)
Vincent A. Crocken, Ph.D., Lecturer (Education)
Richard T. Curley, Ph.D., Associate Professor (Anthropology)
Gordon J. Edlin, Ph.D., Professor (Genetics)
Bruce M. Hackett, Ph.D., Associate Professor (Sociology)
Alfred Hausner, S.D., Professor (Physiological Sciences)
Kurt Keating, Ph.D., Professor (Mathematics)
Nora A. McGuinness, Ph.D., Lecturer (Integrated Studies)
Jay Meichling, Ph.D., Professor (American Studies)
Deborah Pittman, M.A., Lecturer (Music)
Tod W. Reid, Ph.D., Professor in Residence (Ophthalmology)
Mark Sanders, Ph.D., Lecturer (Genetics)
Eric Schroeder, Ph.D., Lecturer (English)
Karen L. Varsou, Ph.D., Professor (Geology)
Gary M. Walton, Ph.D., Professor (Management, Economics)
Daniel L. Wick, Ph.D., Lecturer (Integrated Studies)

**The Program of Study**

Integrated Studies is a freshman honors residential program which introduces students to a variety of disciplines 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 many of its courses fulfill the campus General Education requirements. Enrollments are limited (180-200) and classes are admitted to the program. Class sizes are approximately 25-30.)
Students enroll in at least three Integrated Studies courses during the year. Students not admitted to the Program may not enroll for Integrated Studies courses.

Courses in Integrated Studies

Lower Division Courses

1A. Nature and the Environment: Physics (4) III. Cahill
   Lecture—3 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physical science. (3) Cr. 4

1B. Nature and the Environment: Geology (4) III. Lerner
   Lecture—3 hours; discussion—1 hour. Knowledge of the origins of the universe, of matter, of 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/Introductory.

1C. Nature and the Environment: Molecules to Humans (4) II. Field
   Lecture—3 hours; discussion—1 hour. Prerequisite: high school chemistry. Intended for liberal arts students, integrates the principles of chemistry, biochemistry, genetics and molecular biology. Students are expected to achieve a fair scientific literacy in all of the subjects.

2A. Civilization and Culture: Mathematics and Civilization (4) I. Kirk
   Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Topics from arithmetic, geometry, algebra and probability presented in historical context, which is designed to convey an appreciation of the role math has played in shaping our world and civilization.

2B. Civilization and Culture: Theology (4) I. Robertson
   Discussion—4 hours. Major issues in theology, including the existence and nature of God, the nature and destiny of the human species, free will, and morality from both a western and eastern perspective. General Education credit: Civilization and Culture/Introductory.

2C. Civilization and Culture: Origins of Western Civilization (4) III. Roller
   Lecture—3 hours; discussion—1 hour. Civilizations of the ancient Near East and Greece: the problem of deification, the rise of the West, sciences of law and justice, and development of science and of logical thought. Readings include selections from Near Eastern texts and from Greek literature.

2D. Civilization and Culture: Literature and Writing I (4) I. McGuinness
   Lecture—3 hours; small-group writing workshop. Prerequisite: completion of Subject A requirement. Exposure to basic methods of literary analysis in drama, fiction and poetry and concepts that guide literary scholars in making critical judgments. Formal writing training. General Education credit: Civilization and Culture/Introductory.

2E. Civilization and Culture: Playing Shakespeare (4) III. Schroeder (Dramatic Art)
   Lecture—3 hours; laboratory—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatre professional: producer, actor, director. His use and development of Elizabethan theatre acting space. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

3A. Contemporary Societies: History in Our Time (4) II. Brower
   Lecture—4 hours. The Western World since the second World War covering the Cold War, European reintegration, development of the EU, the spread of the European Union and their relations with the USSR, and the detente of the 70's. General Education credit: Contemporary Societies/Introductory.

3B. Society Through Literature: Modern Europe (4) I. Wick
   Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian experience during the two world wars, the rise of Fascism, Nazi Holocaust, and the decline of Europe as the center of world politics. General Education credit: Civilization and Culture/Introductory.

3C. Society Through Literature: Modern China (4) II. Gibbs
   Lecture—3 hours; discussion—1 hour. China's twentieth-century experience: nationalism, revolution, the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture/Introductory.

3D. Contemporary Societies: Social Policy, Privacy, and Conscience (4) II. Crocken
   Discussion—4 hours. Analysis of the constitutional and philosophical rights of speech, privacy, and conscience as limits on individual and national decision-making. Specific topics to be covered include pornography, 'hate' speech, broadcast codes, book censorship, sexual association, and association with the CF. General Education credit: Contemporary Societies/Introductory.

3E. Contemporary Societies: Sociology (4) III. Hackett
   Lecture—2 hours; discussion—2 hours. Introduction to sociology: the social analysis of life in modern societies; the development of sociological thought and research; social problems, social change and social normative behavior. General Education credit: Contemporary Societies/Introductory.

8. Colloquium (1) I, II, III. The Staff (N. McGuinness in charge)
   Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/N grading only)

8A. Special Topics in Natural Science and Mathematics (4) II, III. The Staff

8B. Special Topics in Humanities (4) I, II. The Staff
   Lecture—3 hours; discussion—1 hour. Group study of a special topic in humanities. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Civilization and Culture/Introductory.

6C. Special Topics in the Social Sciences (4) I, II, III. The Staff
   Lecture—3 hours; discussion—1 hour. Group study of a special topic in social sciences. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Contemporary Societies/Introductory.

9. Seminar (1) I, II, III. The Staff (N. McGuinness in charge)
   Lecture—1 hour. Lectures, films, and readings on the theme of the year. May be repeated for credit. (P/N grading only)

International Agricultural Development

(College of Agricultural and Environmental Sciences)

The Major Program

Today there is a need for trained individuals who can translate and apply recently developed agricultural knowledge and technology to problems of food production, nutrition, health, income generation, marketing, and asset redistribution in less developed nations. Students interested in contributing to the solution of these problems associated with world hunger and health, as well as growth with equity, may wish to investigate the major in International Agricultural Development. Courses in International Agricultural Development are taught by faculty with extensive experience in developing nations.

The International Agricultural Development major provides opportunities to develop competence in a technical field in agriculture or a social science specialization, and, in addition, to acquire those special qualities of mind and spirit needed for effective performance in underdeveloped and developing areas of the world. For a career in International Agricultural Development, you must be perceptive, sensitive, tolerant and understanding, and possess knowledge of the social, political, economic-cultural relationships which characterize developing societies and economies. Graduates concerned with issues and problems in international development may find jobs in government service, in private voluntary organizations, with commercial and consultant firms, and in multinational development companies working overseas.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS
Written/oral expression........................................7-8
See College Requirement........................................7-8
Preparatory Subject Matter....................................42-48
(Choose either Social Sciences or Natural Science core)

Social Sciences core
Chemistry (Chem 1A, 1B)................................10
Computer science (Computer Science Engineering 10)...........3
Science (Biological Sciences 1, Plant Science 2, Animal Science 1, Nutrition 10, Soil Science 10)..........................16
Social sciences (Applied Behavioral Sciences 1, Anthropology 2, Political Science 2, Sociology 1, History 4C)......................16
Statistics (Agricultural Science and Management 150)...............4

Natural Science core
Biological sciences (Animal Science 2, Biological Sciences 1A, 1B, 1C, Genetics 100, Plant Science 2)........................................15
Chemistry (Chemistry 1A, 1B, 8A, 8B)........................16
Mathematics (Mathematics 18A or 21A)........................5
Physics (Physics 8A).............................................4
Statistics (Agricultural Science and Management 150)...............4

Breadth/general education....................................6-24
Satisfaction of General Education requirement.....................20-30

Depth subject matter.........................................39
International Agricultural Development 10, 110A, 110B..............9
International agricultural development..........................9

NOTE: For key to footnote symbols, see page 133.
Non-Introductory. Recommended GE preparation: Economics 1A-1B or Anthropology 2.

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only)

Upper Division Courses

101. Tropical Crop Agriculture (4) II. Buddleja hagae (Agronomy and Range Science)
Lecture—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C, and Soil Science 100 or Agronomy 101. Upper division course to introduce management factors affecting plant agriculture and farming systems in the tropics. Crops are considered in relation to shifting cultivation, rice-based cropping systems, annual cropping, polycropping and monoculture of perennial species.

102. Livestock and Poultry in Developing Nations (4) I. Vohra (Avian Sciences)
Lecture—4 hours. Animal production and problems of specific countries in Asia, Africa, and South America. Feedstuffs, pests, diseases and their control; kinds of animals, domestic and wild and fish suited to these areas; uses of animals for food and for food.

103. Social Change and Agricultural Development (4) III. Brush

110A. Agricultural Development: Production (3) I. Parks
Lecture—3 hours. Prerequisite: upper division standing and an agricultural production course. Organization and utilization of division of labor and resources in low-income countries to produce food and fiber for consumption and trade. Emphasis is on farm management.

110B. Agricultural Development: Marketing (3) I. Parks
Lecture—3 hours. Prerequisite: course 110A or consent of instructor. Postharvest handling, storage, transportation, processing and trade of agricultural products in developing countries. Emphasis upon food marketing systems and development projects.

Graduate Study. A program of study and research leading to the M.S. degree is available in international agricultural development. Detailed information regarding graduate study may be obtained by writing to the Graduate Recruitment Office, Graduate Division, UC Davis.

Graduate Advisers. B. Brush, (Applied Behavioral Sciences); D. Boyd (Anthropology); K.G. Casman (Agronomy 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

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center in AOB 4.

Lower Division Courses

10. Introduction to International Agricultural Development (4) II. Brush
Lecture—4 hours; laboratory—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. General Education credit: Contemporary Societies/
International Agricultural Development (A Graduate Group)

Lovell S. Jarvis, Ph.D., Chairperson of the Group
Group Office, 106 ACOE 4 (916-752-2707/1926)

Faculty. The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had worldwide experience in international development.

The philosophy guiding the IAD 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 in developing nations, graduates should be perceptive and understanding of people, and have a comprehension of how technological, social, economic, and political variables affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate changes.

The IAD program provides a multidisciplinary education designed in recognition of these needs. It guides students to the knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvements in agricultural methods and to encourage social innovations where appropriate.

Graduate Adviser. Contact the Group Office.

International Relations (College of Letters and Science)
Miošlav Nincic, Ph.D., Program Director
Program Office, 351 Voorhies Hall (916-752-3063)

Committee in Charge
Michael R. Caputo, Ph.D. (Agricultural Economics)
Dennis J. Dingemans, Ph.D. (Geography)
Joyce K. Kallgren, Ph.D. (Political Science)
Michèle Frager, Ph.D. (French)
Young-Kwan Yoon, Ph.D. (Political Science)

The Major Program
Cultural, economic, and political ties bind the world together more closely today than ever before. Problems of security, human rights, energy and mineral resources, and the environment are increasingly connected at a global, rather than a national, level. The challenge of world politics and the growth of international business have created opportunities for individuals with a background in international affairs.

With its theoretical and real-world applications, the study of International Relations has become an exciting, rapidly expanding, and highly relevant interdisciplinary major.

The International Relations Program at UC Davis provides a comprehensive approach to the study of today's complex world. This flexible and diverse undergraduate major is the only one of its kind in the nine-campus University of California system.

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 four courses in economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompasses 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 requires fluency in English and a working knowledge (approximately 24 to 27 units of course credits or equivalent fluency) of one other modern language of major significance in international affairs.

Students may substitute another foreign language only with International Relations Program Committee approval.

One program of special interest to International Relations majors is the Education Abroad Program ("junior-year abroad"). Students of international affairs have found ERP an invaluable experience, providing insights into the life and culture of other countries.

Students may obtain academic credit for internships under the sponsorship of the International Relations Program Committee. The work-term program assists students in obtaining internships for academic credit related to their field of study. Legislative, legal, and business internships have proved to be the most popular among International Relations students. The "Davis in D.C." program arranges summer internships in Washington, D.C.

International Relations gives the student a wide range of opportunities for advanced study and for careers in agencies of the federal government, the U.S. government, international or nongovernmental organizations, foundations, newspapers, and companies with 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.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>24-52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Political Science 3</td>
<td>4</td>
</tr>
<tr>
<td>Geography 10</td>
<td>3</td>
</tr>
<tr>
<td>History 4C</td>
<td>4</td>
</tr>
<tr>
<td>One course selected from Anthropology 2, Environmental Studies 30, Geography 2, History 4B, 5A, 5B, 10, 15, 17C, International Agricultural Development 10, Political Science 1, 2</td>
<td>9-4</td>
</tr>
<tr>
<td>Approximately 24 to 27 units (or the equivalent) in one modern foreign language recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)</td>
<td>0-27</td>
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</tbody>
</table>

Depth Subject Matter        | 48-50 |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Economics 115A or 115B</td>
<td>4</td>
</tr>
<tr>
<td>Economics 162A-162B (Cluster II) or 162C (Clusters III, IV, V)</td>
<td>4-8</td>
</tr>
<tr>
<td>(Cluster II students: note prerequisites for courses 160A-160B.)</td>
<td></td>
</tr>
<tr>
<td>Political Science 125</td>
<td>4</td>
</tr>
<tr>
<td>Political Science 130</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 133.

Cluster emphasis: 32

Choose one from the four clusters shown below. Courses must be in addition to those applied toward requirements above.

Total Units for the Major: 72-102

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)
Economics 100
Economics 101
Economics 160A-160B
Economics 160A fulfills one core requirement; Economics 160B fulfills a cluster requirement.

One course to be selected from:
Economics 115A or 115B (whichever course is not used to fulfill the core requirement above) 116
Two courses to be selected from:
Anthropology 122, 126, 131, 135
Geography 141, 142
Political Science 124, 178
Sociology 139, 141, 144, 145A

Two regional courses from Group A (History)

Cluster II: International Relations of the Third World
(Provides students with an opportunity to concentrate on problems of development of the Third World in recent times)

One course to be selected from each of four subjects:
Anthropology 123, 124, 126, 127, 131, 135
Sociology 118, 139, 141, 145A
Political Science 124, 126, 127, 128, 178
Economics 110B, 115A or 115B (whichever course is not used to fulfill the core requirement above) 114

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)

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)

Three courses to be selected from:
Agricultural Economics 175
Economics 123
Environmental Studies 100, 101
Geography 160
Political Science 107

Resource Sciences 100
Two additional courses to be selected from two of the following groups:
Energy—Agricultural Economics 169, Geology 130, Political Science 171
Food Resources—Geography 142, 175, Sociology 144
Population—Sociology 170

Rural Development—Anthropology 126, 131, 133, 135
Urbanization—Anthropology 127, Geography 156, Sociology 143A, 145A

Water Resources—Geography 162, Geology 116
Three regional courses:
Select two courses from Group A (History)
Select one course from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

Cluster IV: World Politics (Examines political relationships in international relations. The focus is on national governments and their activities in the global political system)


One course to be selected from: Political Science 120, 121.
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
One course to be selected from:
Anthropology 123
Geography 143
Philosophy 117
Sociology 118
Four regional courses: Select two courses from Group A (History)
Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

Regional Courses—Group A
History 115A, 115B, 115C, 137C, 141, 143, 144, 145, 146A, 146B, 151D, 155A, 155B, 155C, 161B, 163B, 165, 166B, 168, 174B, 174C, 190C, 193, 194C, 195, 196B (History 102 with advance approval by faculty adviser; History 145, 146A, and 146B may be offered only once toward the major)

Regional Courses—Group B
Anthropology 131, 140A, 140B, 142, 144, 147, 148B, 149
Economics 170, 171, 172, 173
Geography 122A, 122B, 123, 124, 125A, 125B, 126, 127
Political Science 131, 133, 134, 136, 137, 139, 141, 146, 148A, 148B, 148C, 149 (Political Science 129, 139, 179 with advance approval by faculty adviser)
Russian 131
Sociology 147

Major Adviser: M. Ninic (Political Science).

Courses in International Relations

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
190. Topics in International Relations (4) I, II, III. Lecture-discussion—4 hours. Prerequisite: consent of instructor. Selected topics in international relations. Variable content. May be repeated for credit when 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.)
196. 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 Program
Lawrence B. Coleman, Ph.D., Director
The Internship and Career Center 2nd Floor, South Hall (916-752-2853)

Program Areas
Agricultural and Environmental Sciences
Joe J. Stastulat, Program Manager
Education and Graduate Placement
Marg Lee, Coordinator
Kathi Shull, Coordinator
Engineering and Physical Sciences
Kevin T. Bennett, Program Manager
Health and Biological Sciences
Linda R. Hughes, Program Manager
Liberal Arts
Donald J. Hagerly, 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 Transcript Notation with completion of required evaluation and reports. The notation briefly describes the nature and location of the internships experience. Questions pertaining to academic credit and Transcript Notation may be directed to The Internship and Career Center.

Course Credit. Internship courses (numbered 92 and 192) are available for credit on a variable- unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 64 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

Italian
(College of Letters and Science)
JoAnn Cannon, Ph.D., Program Director
Department Office (French and Italian), 516 Sproul Hall (916-752-0830)

Faculty
JoAnn Cannon, Ph.D., Associate Professor
Alfonso De Petris, Professor
Dennis J. Dutschke, Ph.D., Professor; Director
EAP—Padua, Italy
Gustavo Foscari, M.A., Lecturer
Juliana Schoess, Ph.D., Assistant Professor

The Major and Minor Programs
The major in Italian is intended to provide a solid language background which will enable the student to pursue specific international job opportunities and to develop an appreciation for Italian language and culture. The program of Italian studies at UC Davis is designed to provide a solid background in the humanities and fine arts area requirement. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. Also offered are literature courses in translation which are intended for those students not majoring in Italian. A course on Italian culture and civilization is also taught in English.

A degree in Italian provides a well-rounded liberal arts background for graduate studies in the humanities and for a wide range of careers in such areas as civil service, business, travel, library science, and education. Above all, however, it gives the student an opportunity to read some of the greatest literature ever written and to study a country and people which have a unique rich culture and history. A minor in Italian is available to those who want to know of foreign languages is of vital importance in today's increasingly international world. In every sector of society, language skills enhance our chances of getting jobs and successfully keeping them. In a more general sense, our understanding and appreciation of other cultures is dependent on our ability to perceive them clearly; there is no better means of perceiving a foreign culture than through its own language. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live for (brief or longer periods of time) and work in Italy have a choice of cities. Milan for business, Rome for international concerns in agriculture and nutrition at the F.A.O. and Florence for retail commerce and the arts, just to name a few.

The Italian Program actively participates in the Education Abroad Program, the International Internship Program, and the Summer Sessions International (Naples), all of which offer opportunities for travel and study in Italy.

A.B. Major Requirements:

Preparatory Subject Matter: Italian 1, 2, 3, 4, 5, and 9 (or the equivalent)...

Depth Subject Matter: Italian 101 and either 102 or 104...

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 adviser.

Total Units for the Major:...

Recommended
One year of college Latin or a Romance Language.

Major Adviser. G. Foscari.

Minor Program Requirements:

Italian...

Language, Italian 101 and either 102 or 104...

Literature, three courses chosen in consultation with major adviser...

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 104H;

NOTE: For key to footnote symbols, see page 133.
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

Lower Division Courses

1. Elementary Italian (5) I, II, III. Foscari in charge Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.

2. Elementary Italian (5) I, II, III. 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 Lecture-discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.

4. Intermediate Italian (3) I, II. Director in charge Lecture-discussion—5 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises, and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first-year language classes.

5. Intermediate Italian (3) I, II, III. Director in charge Lecture-discussion—3 hours. Prerequisite: course 4 or the equivalent. Review of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand and discuss modern Italian.

8A. Italian Conversation (3) I, II. The Staff Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only)

8B. Italian Conversation (3) II. The Staff Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only)

9. Reading Italian (3) I, II, III. Director in charge Lecture-discussion—3 hours. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

25. Italian Literature in Translation (3) II. The Staff (Program Director in charge) Lecture—1 hour; discussion—2 hours. Course intended to acquaint the non-major 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 extended medium and as a form of mass communication. General Education credit: Civilization and Culture/Introduction.

98. Directed Group Study (1-5) I, II. The Staff Primarily for lower division students. (P/NP grading only)

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar (4) I. De Petris Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

102. Advanced Conversation, Composition, and Grammar (4) II. De Petris Lecture—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor.

104. Italian Translation and Style (4) I. Dutschke Lecture-discussion—5 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material.

107. Survey of Italian Culture and Institutions (4) III. Foscari 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. De Petris 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 anatomy and scientific "curiosity" in three parts: (a) Renaissance man and his environment; (b) philosophical thought: the adversary evaluation of the concept of Man; (c) prose and poetry.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4) I. Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of the original religious and secular poetry of the 13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors.

113. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4) II, III. Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors.

117. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4) II. Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or consent of instructor. Study of Dante's Divine Comedy from the historical context of the Middle Ages to the development of the style in the 14th century. Included are Giovanni Boccaccio's Decameron, in his precessors and Renaissance followers.

115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli (4) I. De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the Renaissance ideas of man and the subsequent loss of faith in this ideal as evidenced in the work of Lorenzo de' Medici, Poliziano, Ariosto and Machiavelli.

115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino (4) II, III. Dutschke Lecture-discussion—3 hours; term paper. Prerequisite: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo's work leading to Marino, and with an excursion on Galileo's role in the formation of a modern literary standard.

118. Italian Literature of the Eighteenth Century (4) I. De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico.

119. Italian Literature of the Nineteenth Century (4) II. De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy. Manzoni, Verga, and Verismo.

120A. Italian Literature of the Twentieth Century: The Novel (4) I, II. Cannon Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini.

120B. Italian Literature of the Twentieth Century: Poetry and Drama (4) I, II. Cannon Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermetism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama.

139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) II. Dutschke Lecture-discussion—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso.

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 with emphasis on Stesicoro, Leopardi, and Manzoni (offered in even-numbered years); twentieth-century Italian authors: discussing emphasis according to the needs of the students.

140. Italian Literature in English Translation: Dante, Divine Comedy (4) I. Dutschke Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: either English 3, Comparative Literature 2, Modern Italian Studies 2, or Italian 101. Alighieri's Divine Comedy through the otherworldly realms of Inferno, Purgatory, and Paradise. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

142. Masterpieces of Modern Italian Narrative (4) III. Cannon Lecture—1 1/2 hours; discussion—1 1/2 hours; term paper. Prerequisite: either Italian 101 or 102. Comparative Literature 2, or History 4C. Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 2, History 4C.

145. Special Topics in Italian Literature (4) I, II, III. The Staff (Director in charge) Lecture—3 hours; discussion—1 hour. 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, war, America, and the image of America, etc. May be repeated for credit when topic changes.

192. Italian Internship (1-5) I, II, III, IV. The Staff (Director in charge) Internship—9-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only)

194H. Special Study for Honors Students (5) I, II, III. The Staff Prerequisite: open only to honors students. Guided research leading to a honours thesis.

197T. Tutoring in Italian (1-4) I, II, III. The Staff Prerequisite: upper division standing and consent of
instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197C. Community Tutoring in Italian (1-5) I, II, III. Foscari
Discussion—1-2 hours; laboratory—2-4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only.)

198. Directed Group Study (1-4) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Japanese
See Chinese and Japanese

Land, Air and Water Resources
(College of Agricultural and Environmental Sciences)
André E. Lutu, Ph.D., Chairperson of the Department
Michael J. Singer, Ph.D., Vice Chairperson of the Department
Department Office, 129 Hoagland Hall
916-752-1406

Faculty
Hoagland Hall Faculty Office
129 Hoagland Hall (916-752-1406)
Daniel G. Aldrich, Ph.D., Professor Emeritus (Soil Science)
Francis E. Broadbent, Ph.D., Professor Emeritus (Soil Science)
Richard G. Burau, Ph.D., Professor (Soil Science, Environmental Toxicology)
John J. Carroll III, Ph.D., Professor (Meteorology)
Kinstel L. Coulson, Ph.D., Professor Emeritus (Meteorology)
Randy A. Davies, Ph.D., Assistant Professor (Soil Microbiology)
C.C. Delwiche, Ph.D., Professor Emeritus (Soil Microbiology)
Emanuel Epstein, Ph.D., Professor Emeritus (Soil Science, Botany)
Donald H. Fox, Ph.D., Professor (Soil Science, Botany)
Robert G. Flocchini, Ph.D., Professor (Soil Science, Botany)
Richard D. Gisby, Ph.D., Associate Professor (Soil Science, Botany)
Gordon L. Huntington, Ph.D., Lecturer Emeritus (Soil Science, Botany)
André E. Lutu, Ph.D., Professor (Plant Nutrition)
Donald N. Munns, Ph.D., Professor (Soil Science)
Leonard O. Myung, Ph.D., Professor Emeritus (Soil Science, Botany)
Terence R. Nathan, Ph.D., Assistant Professor (Soil Science, Botany)
Kaw Tha Paw, Ph.D., Associate Professor (Soil Science, Botany)
H. Michael Riesmauer, Ph.D., Professor Emeritus (Soil Science, Botany)
Victor V. Rendig, Ph.D., Professor Emeritus (Soil Science, Botany)
James H. Richards, Ph.D., Assistant Professor (Plant Nutrition)
Dennis L. Rockey, Ph.D., Professor (Soil Science)

Kate M. Scow, Ph.D., Assistant Professor (Soil Science)
Roger H. Shaw, Ph.D., Professor (Meteorology)
Wendy Kuhn Silk, Ph.D., Professor (Water Science)
Michael J. Singer, Ph.D., Professor (Soil Science)
Su-Tze Soong, Ph.D., Associate Professor (Soil Science, Botany)
L. Dovina, Ph.D., Professor Emeritus (Water Science, Civil Engineering)
Graham E. Fogg, Ph.D., Associate Professor (Glycobiology)
Donald W. Grimes, Ph.D., Lecturer (Water Science)
Mark E. Grinnell, Ph.D., Associate Professor (Water Science, Agricultural Engineering)
Robert M. Hagan, Ph.D., Professor Emeritus (Water Science)
Debrett D. Henderson, Ph.D., Professor Emeritus (Water Science)
Jan W. Hopmans, Ph.D., Assistant Professor (Soil Science, Botany)
Theodore C. Hsieh, Ph.D., Professor (Water Science)
Allen W. Knight, Ph.D., Professor (Water Science)
Miguel A. Maroto, Ph.D., Professor (Water Science, Civil Engineering)
Donald R. Nielsen, Ph.D., Professor (Soil and Water Science)
Marc B. Parling, Ph.D., Assistant Professor (Water Science)
Carlos E. Puerto, Ph.D., Assistant Professor (Hydrology)
Frank E. Robinson, Ph.D., Lecturer (Water Science)
Verne H. Scott, Ph.D., Professor Emeritus (Water Science, Civil Engineering)
Kenneth K. Tani, M.S., Professor Emeritus (Soil Science)
Wesley W. Wellander, Ph.D., Associate Professor (Water Science, Agricultural Engineering)
Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, resource, soil and water science, and water engineering. Teaching and research focus on both fundamental and applied research. The faculty contribute to numerous other undergraduate and graduate programs in the Departments of Letters and Science, Agricultural Engineering, and Agricultural and Environmental Sciences.

Major Programs. Undergraduates in the department major in Atmospheric Science, Resource Sciences, and Soil and Water Science.

Advising Center is located in 122 Hoagland Hall
916-752-1069

Graduate Study. Four graduate programs, Atmospheric Science, Earth Sciences and Resources, Soil Science, and Water Science. Master's degrees in Atmospheric Science, Earth Sciences and Resources, Soil Science, and Water Science are administered by the Land, Air and Water Resources.

Courses. See courses listed under Atmospheric Science, Earth Sciences and Resources, Resource Sciences, Soil Science, and Water Science.

Graduate Study. Graduate work offered in the areas of resource sciences is Atmospheric Science, Earth Sciences and Resources, Soil Science, and Water Science. Detailed information can be obtained from graduate advisers for these areas and the Graduate Announcement.

Boards, Commissions, and Agencies

Cal Poly Pomona Land Use (PLU) Board, 15
PLU Board of Education, 15
PLU Board of Public Control, 15

Academic Senate

Landscape Architecture
(College of Agricultural and Environmental Sciences)
Faculty. See under Department of Environmental Design

The Major Program

This major prepares students for entrance into the profession of landscape architecture. Landscape architects are primarily involved in the planning and design of land areas where human use requires adaptation or conservation of the environment. The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, neural, and social sciences. Students develop proficiency at problem-solving related to design of parks, urban open spaces, energy-efficient neighborhoods, land reclamation projects, and landscape planning for wilderness and scenics 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. 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. 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.

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

Preparatory Subject Matter

Biology (Biology Studies, 1, 10) 3-4
Chemistry (Chemistry 1A, 1B, 10) 3-4
Physics (Physics 1A, 1B, 10) 3-4
English (English 11, 12) 3-4
Public speaking (Rhetoric and Communication) 3
Two-dimensional design (Art 16, Design 21, Engineering 4) 3-4
Three-dimensional design (Art 5, 121A, 141, Design 134A-C, 135, 180A, 180C) 4
Earth sciences (Geography 1, Geology 1, Soil Science 10) 3-4
Economics (Economics 1A, 1B, Agricultural Economics 147) 4-5
Computer science (Computer Science and Management 21, Engineering 5, Computer Science Engineering 40, 41) 3-4
Mathematics (Mathematics 16A, 16B, Statistics 13, Agricultural Science and Management 150) 3-4
Social science (Anthropology 2, Geography 2, 5, Psychology 1, 16, Sociology 1) 3-4

Depth Subject Matter

Introduction to landscape architecture 4
Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113) 12
Landscape graphic communication (Landscape Architecture 121) 4

NCTE: For key to footnote symbols, see page 133.
Advanced communication for landscape architecture

Introduction to landscape construction, site engineering, construction details and drawings

History of landscape architecture

Introduction to environmental plants

Taxonomy and ecology of environmental plants

Arboricultural plantings

Plant selection for environmental design

Landscaping of existing sites

Landscaping studio: planning and analysis, urban and community design

Senior project in landscape architecture

Proseminar: landscape architecture major

Internship (landscape architecture)

Breadth Subject Matter

Ecology

Environmental awareness

Related disciplines elective

Unrestricted Electives

Total Units for the Major

Advising Center located in 152 Walker Hall (916-726-1158)

Graduate study: Refer to the Graduate Division section in this catalog.

Courses in Landscape Architecture

Lower Division Course

Landscape Studio: Introduction (3) Ill. The Staff

Landscape Drafting and Visualization (4) I. The Staff

Landscape Construction: Introduction (3) III. The Staff

Landscape Construction: Details (4) Ill. The Staff

Upper Division Courses

Landscape Studio: Analysis, Function, and Process (4) I. The Staff

Landscape Architecture Studio: Formation, Design, and Art (4) II. The Staff

Landscape Architecture Studio: Site Planning (4) III. The Staff

Computer Graphics for Landscape Architects (4) I. McNeil

Advanced Communication for Landscape Architecture (4) Ill. The Staff

Landscape Construction: Site Engineering (4) II. The Staff

Landscape Ecology (4) I. Dawson

Sustainable Landscape Architecture (4) II. The Staff

Upper Division Course: Proseminar

Internship in Landscape Architecture

Note: For key to footnote symbols, see page 133.

Landscape Construction: Drawings (4) I. The Staff

Landscape Architecture Studio: Analysis, Function, and Process (4) I. The Staff

Landscape Architecture Studio: Site Planning (4) II. The Staff

Computer Graphics for Landscape Architects (4) I. McNeil

Landscape Architecture Studio: Formation, Design, and Art (4) II. The Staff

Landscape Architecture Studio: Site Planning (4) III. The Staff

Computer Graphics for Landscape Architects (4) I. McNeil

Advanced Communication for Landscape Architecture (4) Ill. The Staff

Landscape Construction: Site Engineering (4) II. The Staff

Landscape Ecology (4) I. Dawson

Sustainable Landscape Architecture (4) II. The Staff

Upper Division Course: Proseminar

Internship in Landscape Architecture (4-12) I. III. The Staff

Field experience: Prerequisite: senior standing in

40. Introduction to Landscape Architecture (3) I. II. Francisco

Lecture: 3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces.

Upper Division Courses

111. Landscape Studio: Analysis, Function, and Process (4) I. The Staff

Studio—8 hours. Prerequisite: course 11. Studio problems in the analysis of site and functional relationships relating to landscape development. Emphasis on theory and analysis of natural and cultural site features, micromorphic effects, pedestrian/bicycle/vehicular circulation, and basic social needs and uses of outdoor space.

112. Landscape Architecture Studio: Form, Design, and Art (4) II. The Staff

Lecture-discussion—2 hours; laboratory—6 hours; field trips. Prerequisite: course 111; major in landscape architecture. Studio problems in design of landscapes and outdoor spaces which rely on visual, spatial, aesthetic, and symbolic characteristics.

113. Landscape Architecture Studio: Site Planning (4) III. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 112. Open to Landscape Architecture major only. Studio problems in analysis, planning, and design of intermediate-scale landscape developments involving the stringing of structure, design of circulation routes, open spaces, and outdoor facilities. Emphasis on residential, institutional, and commercial site planning for solar/energy conservation.

120. Computer Graphics for Landscape Architects (4) I. McNeil

Studio—8 hours. Prerequisite: course 21. Introduction to computer-aided design equipment and software applications, including computer-aided drafting, cut and fill calculations, road alignment, site engineering, and landscape analysis.

121. Landscape Graphic Communication (4) II. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 111. Studio work in graphic representation of landscapes and landscape architectural plans. Introductory work in sketching, rendering, lettering, streets, layout, color use, and presentation techniques relating to the professional practice of landscape architecture. Limited enrollment.

122. Advanced Communication for Landscape Architecture (4) Ill. The Staff

Studio—9 hours; two all-day field trips. Prerequisite: course 121. Open to Landscape Architecture majors only. Advanced concepts in multimedia and graphic presentation of landscape architecture projects, to include preparation of proposals, reports, audio-visual productions, and mixed-media presentations. Limited enrollment.

131. Landscape Architecture: Principles of Practice (3) III. The Staff

Lecture—3 hours. Prerequisite: course 31. Exposure to the legalities, expectations, and ethical standards of the profession of Landscape Architecture. Subject matter covers marketing, office management, liability, licensing, business plans, professional skills and project management.

132. Landscape Construction: Site Engineering (4) II. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 131. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut and fill calculations. Limited enrollment.

133. Landscape Construction: Details (4) Ill. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 132. Open to Landscape Architecture majors only. Advanced study of materials and methods in landscape construction. Emphasis on studio design and integration of details and specifications. Limited enrollment.

134. Landscape Construction: Drawings (4) I. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 133. Technical solution of an intensive landscape architectural design problem with emphasis on preparation of product construction implementation documents. Limited enrollment.

140. History of Landscape Architecture (3) III. McNeil

Lecture—3 hours. History of landscape architecture as an art form, technique, and profession. Emphasizes design of gardens and outdoor spaces from prehistoric civilizations to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1A, 1B, or History 3.

155. Plants in the Cultural Environment (3) III. Dawson


156. Landscape Planting Design (4) I. The Staff

Studio—8 hours. Prerequisite: course 111, 155, Environmental Horticulture 105. Application of aesthetic, functional, and horticultural principles to the composition of the planted landscape and the development of planting plans.

159. Public Garden Management (3) III. The Staff

Lecture—3 hours. Prerequisite: Biological Sciences 1C, Plant Sciences 3C, Horticulture 6. Management of the collections, facilities, and programs of public gardens. Emphasis placed on the management skills and operational techniques utilized in public gardens.

161. Landscape Architecture Studio: Planning and Analysis (4) I. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 113. Landscape architecture studio to include the solution of large-scale landscape architectural problems with emphasis on landscape planning and analysis methods and environmental concerns. Limited enrollment.

162. Landscape Architecture Studio: Urban and Community Design (4) II. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 181. Solution of community and urban landscape design problems with emphasis on community and social processes, participatory design methods, and comprehension of behavioral factors relating to urban open space. Limited enrollment.

183. Landscape Ecology (4) I. Dawson

Studio—8 hours. Prerequisite: course 113 and Environmental Studies 100 or consent of instructor. Practical exercises in ecological design emphasizing conservation, habitat restoration, cultural impacts, and bioregionalism. Environmental management techniques, restorative methodology, and physical land use planning.

184. Sustainable Landscape Architecture (4) II. The Staff

Studio—8 hours. Prerequisite: course 113 or consent of instructor. Planning and design of land areas for social and environmental stability creating sustainable landscapes which conserve water, energy, aesthetic, social, and biological diversity.

190. Proseminar in Landscape Architecture (1) I. III. Thayer, Francis, McNeil

Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. Professional grading only.

192. Internship in Landscape Architecture (1-12) I. III. The Staff

Field experience. Prerequisite: senior standing in
Law, School of

Bruce J. Wolk, J.D., Acting Dean of the School
Mortimer D. Schwartz, J.D., LLM, M.S., Associate Dean (Law)
Martha S. West, J.D., Associate Dean (Administration and Student Affairs)

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Faculty
Homer G. Angelo, J.D., LLM, Professor Emeritus
John D. Ayer, J.D., LLM, Professor

Latin
See Classics

Law, School of

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NOTE: For key to footnote symbols, see page 133.
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 for trial through pleading, discovery, and pretrial; devices for resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial court dispositions. (Deferred grading only, pending completion of sequence.)

2010-11, Torts (3-2-1). Kurz, Juenger Discussion—2-3 hours. Course in tort law is designed to familiarize the students with the legal concepts which apply to actions brought by litigants who seek relief for injury. It is concerned with intentional and unintentional invasions of personality and property. More specifically, the course seeks to analyze civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. Alternatives to the present tort compensation system are also considered. (Deferred grading only, pending completion of sequence.)

205. Constitutional Law (4) II. Brownstein, Glennon Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it covers judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. Also begun is an examination, continued in the second semester, of the procedural and substantive constitutional rights and the limits they place on governmental action.

210. Business Reorganization (2) II. Goodpaster Discussion—2 hours. Course 243 recommended. Focus is on businesses trying to survive when they are in substantial debt, exploring the structure of relief available under Chapter 11 of the Bankruptcy Code. Focus is on the debts of a troubled debtor and the strategies or options available to meet them.

211. Negotiation and Dispute Resolution (2) II. Goodpaster Seminar—2 hours. Course teaches negotiation, mediation, arbitration skills, and theories. Students will do five or more practice negotiations, mediations, or arbitrations to develop skills, perception, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment.

212. Law, Medicine, and Ethics (2) II. Brownstein, Ziochi Discussion—4 hours. The role of the medical and economic analysis of problems posed or soon to be posed by advances in biomedical technologies. Includes examination of problems raised by: (1) behavior control through drug ingestion, including psychiatric drugs, tobacco, and electric stimulation of the brain; (2) genetic engineering; (3) amplification of human powers and faculties by artificial means; (4) augmentation, enhancement, machine symbiosis, and pharmacologically-induced enhancement of mental functioning; (4) death and dying; and (5) regulation of experimentation with human subjects. In each area, discussion will include problems in distributive justice posed by limited availability of biotechnological commodities, as well as issues arising from enforced treatment.

213. Business Organizations I (3) I. Fekker Discussion—3 hours. Focus on 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 proxy voting system, 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.

214. Business Organizations II (3) II. Dukelow Discussion—3 hours. Bradley University's role in the development of the public issue corporation in course 213, this course centers 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 sole proprietorship, general and limited partnerships, and joint ventures. Related agency concepts are integrated into this material.

215. Business Associations (4) II. Hillman 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. Legal aspects of partnerships are also treated briefly. Topics surveyed include the planning of business transactions, the process of incorporation, the financing of corporations, the role of management and shareholders, the federal securities laws, and social responsibility.


217. Constitutional Law I (3) I. Brownstein, Glennon, Poulos Discussion—3 hours. This is a two-semester course. The first semester covers the principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it treats judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. Also begun is an examination, continued in the second semester, of the procedural and substantive constitutional rights and the limits they place on governmental action.

218. Constitutional Law II (3) I. Brownstein, Poulos 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 national origin. The substantive, affirmative action, the problem of "invidious motive," state action, and the extent to which the equal protection clause prevents government from burdening the exercise of fundamental rights. The Establishment Clause and the Free Exercise Clause will also be considered.

219. Evidence (4) I. Wydick, II. Hogan Discussion—4 hours. The rules regarding the admissibility of testimony 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, and the constitutional aspects.

220. Federal Income Taxation (4) I. Simmons, II. Wolk Discussion—4 hours. Introduction to basic principles of federal income taxation. Topics include identification of income subject to tax, gains and losses from property transactions, deductions from income, the timing of income and deductions (tax accounting), and the identity of persons subject to tax on particular items of income.

221. Trusts, Wills and Decedents' Estates (3) I. Dobris, II. Kriekard Discussion—3 hours. Study of the law of wills and trusts. Course covers the common law doctrines of testamentary disposition; family protection and limits on the power of testation; execution, revocation and revival of wills; contracts to make wills; will substitutes; inter vivos and testamentary private trusts. Depending on the instructor, the course may also cover one or more of the following topics: class gifts; powers of appointing; 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 (5) Discussion—3 hours. Exportation and importation of agricultural products will be covered, including tariffs, quotas, 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) II. Dobris Seminar—2 hours. Prerequisite: course 221. Selected topics in the estate planning area. Class presentation and research paper will satisfy the legal writing requirement. Limited enrollment.
234. Consumer Transaction (3) I. Loiseau
Discussion—3 hours. Study of selected consumer law problems, including a survey of state and federal regulatory efforts. Course coverage may include the following: consumer protection, law and statutory approaches to fraudulent or deceptive practices, disclosure of information, consumer credit regulation, equal credit opportunity legislation, quality standards, enforcement of the consumer credit laws, and attorney fees for representing consumers.

225. Marital Property (3) I. Dailey; II. Bruch
Discussion—3 hours. The California community property system including rights of spouses and treatment of property; character, classification, valuation, and division of property upon termination of marriage by dissolution, nullity, or death; and premarital contractual agreements. Also covers nonmarital cohabitation, creditor's rights, and spousal support.

226. Mass Media Law (2)
Discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will include legal problems of news media and news gathering, the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

227. Minimizing Civil Procedure (3) I. Permas; II. Feeley
Discussion—3 hours. The police function: arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineups, the exclusionary rule, the role of counsel.

228. Nonbusiness Plantation Law (3)
Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 214 or course 215. Consideration of selected problems in business planning.

229. Agricultural Law Seminar (2)
Seminar—2 hours. Study of selected current issues in agricultural regulation and trade. Instructor and students will select issue areas for study. Class presentation and paper required.

230. Family Law (Short Course) (2)
I. Discussion—3 hours. Survey of history, current law, and policy regarding marriage, divorce, and their consequences. Extent of governmental intrusion into individual and family privacy is the overriding policy issue. Role of the family lawyer is the key practical issue. Among subjects covered are constitutional framework, nonmarital cohabitation, marriage regulation, spouse abuse, juvenile court overview, divorce, support, custody, and adoption confidentiality. Conflict of laws and marital property not included.

231. Legislative Process (3) II.
Discussion—3 hours. Course covers fundamental elements of legislative processes, including legislative procedure; the legislature as an institution; the legislative investigatory power; lobbying; legislative-executive relations; and the legislature's constitutional powers and limitations.

232. Real Estate Finance (3)
Discussion—3 hours. Examination of the problems involved in the acquisition, financing and development of real estate and of lender remedies and debtor protections in the event of debtor default. Course strongly oriented toward current California law, and toward practical application of legal doctrine.

233. International Human Rights (2)
Seminar—2 hours. Selected topics pertaining to the protection of individuals under treaties and norms of customary international law. Specifically, the seminar will cover to the extent to which national courts are required to uphold such rights; how the U.N. can create human rights norms; the investigation of violations of human rights law; remedies, and international enforcement mechanisms; the use of force for human rights purposes; and the substantive requirements of specific human rights norms such as those concerning war crimes, genocide, apartheid, and torture. Some Seminar paper will satisfy the advanced legal writing requirement.

234. Family Law Practice (3) I. Lamon, Fitzmanrow
Seminar—2 hours: clinical—1 hour. Prerequisite: course 225; course 230 or 272 (concurrently) recommended. Combined seminar and clinic to provide marital-legal counselling 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 areas pertaining to family law practice. Limited enrollment. (SU grading only.)

235. Administrative Law (2) I. Gandara
Discussion—2 hours. Prerequisite: course 217. Control of the administrative operations of government will be studied. Federal regulation of business enterprise and of the provision of social services and subsidies will be the principal examples of subject to be treated. Various statutory delegations of power to administrative agencies and attempts by the judiciary, executive and legislative branches to control these delegated powers will be studied in some depth. The protection of individual rights, such as those of employees and recipients of governmental benefits, in the complex administrative state, and the regulation of particular industries, will also receive attention.

236. Securities Regulation (2) II. Hillman
Discussion—2 hours. Prerequisite: courses 213 and 214, or course 215. The primary purpose of this course is to familiarize students with laws and regulations, federal and state, relating to the issuance of and trading in corporate securities. It includes materials pertaining to the scope of the term "securities," the registration process, insider trading, private offerings, and civil liability under the Securities Act of 1933 and the Securities Exchange Act of 1934.

237. Commercial Paper (3)
Discussion—3 hours. Course in the law of commercial paper and methods of securing the payment of commercial debts. Emphasis will be on bills of exchange, promissory notes, and checks. (SU grading only.)

238. Basic Federal Income Taxation of Business Enterprise (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 tax on both the external and shareholder levels. This course examines the identity, organization, operation, and dissolution of pass-through entities in terms of the income tax impact of these transactions. Income tax planning, corporations, capitalization, operation, and liquidation of regular corporations subject to the double tax regime of subchapter C of the Internal Revenue Code.

239. Sentencing Seminar (2) II. Feeney
Seminar—2 hours. Consideration of sentencing goals, procedure, present alternatives, and suggested changes. Guest, class presentation and required seminar paper.

240. Law of Elections and Political Campaigns (2) I. Feeney
Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and state provisions relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest.

241. Legal Accounting (2)
Discussion—2 hours. Introduction to accounting for non-accountants. The goal is to provide background and skill that students may put to work in other law school courses and in practice. Basic concepts will be stressed to assure that accounting fundamentals are understood and that their relation to legal problems may be demonstrated. Students with substantial prior accounting experience (more than six credit hours) may not enroll in this course.

242. Conflict of Laws (Long Course) (4) I. Juenger
Discussion—4 hours. Study of transactions with multisite or international contacts. The topics covered include jurisdiction, recognition of foreign judgments, and the impact of applicable law. 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 the motivations and why debtors file "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) II. Gray
Lecture—2 hours. Overview of the anatomy and physiology of the human body, giving the law student a basic understanding of the normal structure and functioning of the various organ systems. Medical terminology is stressed and students have an opportunity to analyze the medical aspects of several major legal cases. (SU grading only.)

245. Estate and Gift Taxation (3)
Discussion—3 hours. Prerequisite: course 220. Study of the federal taxation of gifts, trusts, and estates.

246. Federal Jurisdiction (3) I. Oakley
Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Statutory provisions for the federal district courts to adjudicate civil actions arising 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 Federal Income Taxation of Business Enterprise (3) I. Simmons
Discussion—3 hours. Prerequisite: course 220 and 236. Continuation of course 236. Focuses on the federal tax consequences of the sale or acquisition of a corporation or 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. Glennon
Discussion—3 hours. Prerequisite: course 217 recommended. This introductory 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; espionage; the relations between internation law and national law; and the jurisprudence of international law.

249. Comparative Law (2)
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 transaccations.

250. Jurisprudence (2) I. Oakley
Seminar—2 hours. Course considers 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 decisions about the legal rights of the parties to a law suit? Does it matter if the judge is interpreting precedent rather than legislation?

NOTE: For key to footnote symbols, see page 133.
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Introductory readings of a general and synthetic nature will be followed by a sampling of philosophi-
cal essays analyzing particular problems of adjudica-
tion. Grading will be based on active class partici-
patory involvement and a term paper which meets the
standards of the advanced legal writing requirement.
Limited enrollment.

251. Labor Law (3) I. West
Discussion—3 hours. Study of federal labor law, primarily
statutory, relating to: (1) employee organization and
the establishment of the collective bargaining rela-
tionship; (2) the negotiation of the collective bargain-
ing process; and (3) the exertion of primary and
secondary economic pressure. Federal law will be
compared with state wrongful discharge law.

252. Gender-Based Discrimination (3)
Discussion—3 hours. Focuses on legal issues raised by legal and social discrimination
between men and women. It explores potential
remedies drawn from constitutional law, statutory
enactments, and common law developments. Sub-
ject matter areas include sex-based discrimination in
family law, educational opportunity, and criminal law.

253. Products Liability (3) I. Hogan
Discussion—3 hours. Action for harm to the
consumer resulting from dangerous and defective
products.

254. Seminar in Legal History (2) I. Rabin
Seminar—2 hours. Most students have only a haphazard
exposure to the persons, events, and concepts
that have shaped American law. Thus Ameri-
can legal history is a common cultural herit-
age that would facilitate communication and shared val-
es. In this seminar, each student would choose, in
consultation with the instructor, a particular person,
event, or concept to be the subject of his or her paper.
Possible topics might include: a biography, together with representative opinions or briefs, of an
outstanding lawyer or jurist; the historical back-
ground of a key judicial decision or statute; the importance and effect of a particular development in legal education or legal theory. Each student will be required to prepare and present a paper that will fulfill the legal writing requirement.
Each paper, together with its supporting documents,
would be used as the nucleus of teaching materials
that might be published for use in courses in legal
history. Limited enrollment.

255. Pension Law (3) II. Wolk
Discussion—3 hours. Federal regulation and taxation of
private pensions and other forms of deferred com-
ensation, and their relationship to employee retirement
benefits. The course will focus on the Employee Retirement
Security Act of 1974 (ERISA) and will deal with such top-
ics as coverage, vesting, integration with social
security, benefits for survivors, and the liquidation of
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 consid-
ered, including bankruptcy issues. Pension Benefit
Guarantee Corporation insurance, and the issue of asset
maintenance to employers in the case of over-
funded plans.

256. Land Use Planning (3) II. Kirkland
Discussion—3 hours. Legislative, judicial, and
administrative methods used to facilitate the rational use or management of land and water.
The course text will include zoning, subdivision regulation, nuisance, eminent domain, general plans, and
environmental controls affecting land use.

257. Foreign Property 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 and military assistance, the
recognition and control of the negotiation process, the sources of the appropriations power as a check on executive activities, and other separation-of-powers issues generated by the intersection of international law and
constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

258A. Professional Responsibility (1) I. Wydick,
Schwartz
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.)

258B. Professional Responsibility (2) I, II. Per-
schachter
Discussion—2 hours. Prerequisite: course 258A.
Continuation of course 258A. Discussion in greater
depth of problems and issues of professional responsibility. Also covered will be issues of profes-
sional versus personal responsibility and choices for
students' professional lives. Students who sign up to
take the course for two units will take a multiple
choice examination as a midterm and will continue
on in the course for the rest of the semester.

259. Disability Rights Law (2) I. Wolinsky
Discussion—2 hours. Survey of legal issues involving
the rights of disabled persons. (SU grading only.)

260. Employment Discrimination (3) II. West
Discussion—3 hours. Consideration of employment
discrimination cases based on age, color, religious
affiliation, national origin, age, and sexual orientation. Course
will focus on Title VII of the Civil Rights Act of
1964, and include coverage of Art. 1961, Art. 1963, the
Equal Pay Act, and the Rehabilitation Acts. State and
local employment laws will also be discussed.

261. Local Government (2)
Discussion—2 hours. Examines selected topics of
current interest to California cities and counties. The
least this course could cover includes: (a) California Tort Claims Act, (b) Administrative Pro-
cedure Act, (c) antitrust liability of local govern-
ments, (d) eminent domain law, and (e) section 1983
(civil rights) of the Civil Rights Act of the federal
government. Torts against local and county officials.
Course is particularly useful for persons who may
work for city attorneys or county counsels.

262. Antitrust (3) I. Wydick
Discussion—3 hours. Study of the federal antitrust
laws including price fixing, limits on distribution,
yielding arrangements, monopolization, and mergers.

263A. Trial Practice I (3) I. llwinkelneder
Discussion—2 hours, laboratory—2 hours. Prerequi-
site: course 219. Introduction to the preparation
and trial of cases, featuring lectures, videotapes, dem-
strations, assigned readings and forensic drills. Labo-
atory will be held on Tuesday, Wednesday, or Thurs-
day evening. Limited enrollment.

263B. Trial Practice II (2)
Discussion—2 hours. Prerequisite: course 263A.
Advanced trial practice and litigation skills course
featuring student preparation of and participation in
mock trials with occasional class sessions. (SU
grading only.) Limited enrollment.

254. Water Law (3) I. Dunning
Discussion—3 hours. Property rights in surface
waters, including riparianism, prior appropriation and
federal reserved rights; water administration instit-
ations, 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 Resource Law (2)
Discussion—2 hours. Prerequisite: consent of instruc-
tor or course 264, 265, or 267. Examination of pub-
lic rights to the use of natural resources. Each stu-
dent will select one topic for development within the
seminar and will be expected to prepare a substan-
tial research paper on that topic which would satis-
fy the advanced legal writing requirement. Limited
enrollment.

266. Wildlife Protection Law (2) II
Discussion—2 hours. Course will encompass federal
and state laws directed at wildlife protection, as well
as international laws. The seminar will satisfy the
advanced legal writing requirement.

267. Civil Rights Law (2) I. Bernhard
Discussion—2 hours. Surveys racial patterns in
American law. May include the following: history of
racial discrimination in public facilities, voting, the
administration of criminal justice, public schools,
housing, and employment. In addition, considers the
remedies for racial discrimination, including actions
Civil Rights Act of 1964; the Fair Housing Act of
1968; the Equal Credit Opportunity Act; and the
Title VII (employment); the Voting Rights Act of
1965.

268. Seminar in Jewish Law (2) I. Rabin
Discussion—2 hours. The term "Jewish Law" refers to
those subjects that have been taught in an American
law school as they have been approached by the
Jewish legal system. This system is based primari-
ly 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 immedi-
ate practical value, but because it is a foreign legal
system that is one of the oldest in the world, and one
that has faced many of the problems now facing
American law. Specifically, although Jewish law is
purportedly based on immutable religious law,
changing conditions over the centuries have encour-
ged methods of adaptation that are reminiscent of
American constitutional law. Each student will be
required to prepare and present a paper that would
fulfill the advanced legal writing requirement. Neither a
knowledge of foreign languages nor a priorous
exposure to Jewish law is necessary. Limited enrol-
ment.

269. Corporate Finance (3) II. Ayres
Discussion—3 hours. How businesses raise money.
Consists of two parts: a study of element of a
financing theory and corporate law. and consider-
ation of how this theory is applied by courts and legis-
latures.

270. International Business Transactions (2)
Discussion—2 hours. A study of some of the selected problems in international business transactions.

271. Labor Law Seminar (2) II
Seminar—2 hours. Study of current questions from a critical legal studies perspective, including cases
pending before the Supreme Court, law reform, and
impasse resolution in the public and private sectors,
union authority and individual rights, the rights of the
unorganized, the assumptions and myths of Ameri-
can labor law, labor relations of multinational corpo-
rations, and comparative industrial democracy
("paternalism", work councils, codetermination, and
self-management). Satisfaction advanced legal writing
requirement. Limited enrollment.

272. Family Law (Long Course) (3)
Bruch
Discussion—3 hours. Designed for the student with a substantial interest in Family Law. Emphasizes the
legal, social, and emotional aspects of parent-child
relationships, including decisions concerning medi-
care, neglect, dependency, abuse, foster care,
termination of parental rights, adoption, artificial
impregnation, surogacy, paternity, legitimacy, sur-
names, birth control, abortion, child support and
child custody. How attorneys, mental health profes-
sional 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 Proper-
ty (2) II. Bruch
Seminar—2 hours. Prerequisite: course 225, course
227, or consent of instructor. Exploration in depth of important current issues in the fields of fam-
ily and marital property law. Heavy emphasis on law
reform, including study and direct observation of the
legislative process, will set the stage for the division of
development and presentation in the seminar. A research paper or draft bill and supporting
analysis is required. A more lengthy paper with addi-
tional oral credit may be arranged with the consent of instructor to satisfy the legal writing requirement.

274. Intellectual Property (3) I. Kurtz
Discussion—3 hours. Study of the protection of intel-
llectual property and unfair competition. Among the
topics considered are trade secrets, patents, trade

NOTE: For key to footnote symbols, see page 139.
marks, misleading and false advertising, and copyrights.

275. Business Litigation (2) I. The Staff
Discussion—2 hours. Focuses on issues that fre-
quently arise in large, commercial litigation. The
class will read and discuss materials, including case
studies, raising issues of advanced civil procedure,
including evidence, discovery, and trial. The class will
cover areas such as the attorney-client privilege and
work product doctrine, discovery and "discovery
abuse," and the settlement of multi-defendant cases.
Although many of these issues are touched on in the
first-year civil procedure course, we will delve into
them in greater detail and discuss some of the
issues currently being litigated. The class will also
discuss if, in the author's opinion, litigators may face
in representing corporate clients, such as the
decisions attorneys in large law firms must make
when assigned a case, or are to be taken by a client to
take action, which, although legal, they believe to be
morally objectionable.

276. The Juvenile Justice Process (2) I. Parnas
Discussion—2 hours. Legal and philosophical basis
of a separate juvenile justice process; police investi-
gation, apprehension, and diversion; probation
intake and detention; juvenile court hearing and dis-
position; juvenile corrections. Major emphasis is on
the development and implementation of each phase of
the process. Guest speakers and field trips.

277. American Indian Law (2)
Discussion—2 hours. Study of the distinctive legal
duties relating to Indians, Indian tribes, and Indi-
an reservations. May be taken only once during any
one semester. Credit may be given for either law
and jurisdictional powers of federal, state, and tribal govern-
ments over Indians and over non-Indians residing on
or doing business on Indian reservations. The law on
Indian lands, waters, and fishing and hunting rights
will also be emphasized.

278. Pretrial Skills (3) I. Johns
Discussion—3 hours. Course uses a role-
playing exercises and class discussions to introduce
students to a skilled pretrial skills basic to the prac-
tice of law. The course concentrates on client inter-
viewing and counseling, but will also include exercises
in witness interviewing, negotiation, drafting of
pleadings, discovery plans, and discovery docu-
ments. It is an expanded version of the client coun-
selling course. Limited enrollment.

279. Public Sector Labor Law (2)
Section A—Professor: course 251 or con-
tent of instructor. Application of private sector labor
law doctrines to the public sector. Emphasis is on the
tour California public sector statutes and the impact of
collective bargaining on public employees. Class pre-
paration and seminar paper will satisfy advanced legal
writing requirement. Limited enrollment.

280. Advanced Legal Writing Seminar (2) W
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 stu-
dent will complete an individual writing project in lieu
of final examination. The writing project will satisfy the
law school's advanced legal writing requirement.
Limited enrollment. (SU grading only.)

281. Children and the Law (2)
Discussion—2 hours. Prerequisite: course 230 or
272 and consent of instructor. Course will consider the
child in relationship to the family and society. Atten-
tion will be given to such topics as paternalism and
legitimacy; custody, foster care, and adoption; juve-
nile guardianship and custody; rights to support; birth
control and education; legal capacity and emancipation.

282. Energy Law (2)
Discussion—2 hours. Prerequisite: course 235. Introdu-
cution to law and the energy policy sector. Topics to
be covered include regulation of natural monopolies,
regulation of electricity and natural gas, legal
aspects of the development of conventional and alter-
native energy sources, and international dimen-
sions of energy development and regulation.

283. Remedies (3) I. Love; II. Hogan
Discussion—3 hours. Study of common law reme-
dies: damages, specific performance, injunctions,
and restitutionary relief. Focus of course will be on
the efficiency, legal importance and practicality of the alter-
native remedies available to the practitioner and the
court.

284. Advanced Criminal Procedure (3) II.
Discussion—3 hours. Essentials to those who wish to
handle criminal defense. In particular, it treats bail,
prosecutorial discretion, plea bargaining, trial by jury,
and sentencing. (Course 227 need not be taken before
this course.)

285. Environmental Law (3) I. Dunn
Discussion—3 hours. Introduction to the law dealing
with environmental impact, particularly the National
Environmental Policy Act, and to pollution control
law. Particular emphasis is given to the Clean Water
Act and various statutes on toxics in the environ-
ment. An introduction to the Clean Air Act is also
provided.

286. Law and Economics (2)
Discussion—2 hours. Course will examine a number
of legal issues using economic analysis. Possible
topics include the economic consequences of liabil-
ity rules, economic analysis of contract law, theory of
the firm and economic aspects of corporate law and
antitrust, the theory that the common law is efficient,
and economic interpretations of basic concepts of Anglo-American law such as rights, property,
and equality. Prior background in economics is wel-
come but not necessary.

287. Public Land Law (2) I. Dunn
Discussion—2 hours. Legal aspects of federal land
management, including the history of public land
law, authority over federal lands and specialized law
dealing with particular natural resources and uses
found on federal lands (mining, timber, range, wild-
life, recreation and preservation).

288. Advanced Constitutional Law Seminar (2)
I. Seminar—2 hours. Seminar. Explores in-depth selected topics or problems in constitutional law and theory.
Topics may include public choice theory, the public
privileges doctrine, the relationship of constitutional orders, 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 pro-
cess, equal protection, affirmative action, and consti-
tutional litigation. Satisfies advanced legal writing requirement. Limited enrollment.

289. Toxics Law (2) II. Dunn
Discussion—3 hours. Seminar. Environmental efforts to regulate the release of toxic chemicals to the environ-
ment and to clean up existing toxic dump sites. "Toxic torts"—personal injury actions related to toxics in the environment.

290. Criminal Justice Administration Seminar (2)
I. Parnas Seminar—2 hours. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the pre-trial process. Specified topics will include bail reform and pre-trial detention, criminal
discovery, and the charging process. Class presen-
tation and seminar paper will satisfy the advanced legal writing requirement.

291. Mexican-American Legal Relations (3) I.
Discussion—3 hours; final examination or research
paper on approval by instructor. Course will include
a description and juridical analysis of the differ-
ences and similarities of the legal and political sys-
tems of the two countries; a survey of the legal
aspects of doing business in Mexico; foreign invest-
ment; Mexico's external debt; trade (including
imports and exports, oil, the GATT, technology trans-
fer and intellectual property); selected bilateral and
multilateral treaties, executive agreements and
regional international law. Satisfies advanced legal
writing requirement.

292. Immigration Law and Procedure (3) I. Smith
Seminar—3 hours. Course will survey a brief history of U.S. immigration and policy and compare the poli-
cies of other industrialized nations and second-
ary sources of immigration law; federal agency
interrelationship (Justice and State Department);
entry of nonimmigrant (temporary) visitors and immi-
gres to the United States; the world-wide quota and pre-emptions systems; family and employment
relationship critical to securing favored immigrant
status; deportation procedures; discretionary relief
available to persons otherwise subject to deporta-
tion; use of administrative defenses to enforce exclusion proceedings; refugee and asylum law; administrative
appeals; federal and state judicial relief; citizenship
and naturalization. Students will participate in mock
deporation and asylum hearings.

293. Public Interest Law Seminar (2) I. Johnson
Seminar—2 hours. Examines various aspects of public interest litigation and practice. Includes a sur-
vey of litigation techniques and problems common to
to public interest practice.

294. Problems in Fiduciary Administration (2) II.
Dobris Seminar—2 hours. Prerequisite: course 221. Select-
ted topics in the area of fiduciary administration of
estates and trusts. Required class presentation and
research paper will satisfy the advanced legal writing
requirement. Limited enrollment.

295. Advanced Civil Procedure (2)
Discussion—2 hours. Treated in-depth of topics
introduced in the basic civil procedure course and
characteristic of modern multiparty, multicourt litiga-
tion. Areas studied include joinder of parties in com-
plex federal court litigation, the role of the judge in
judicial management of litigation, multidistrict litiga-
tion in federal courts, and preclusion (res judicata and
collateral estoppel). No all topics will be cov-
erved in one semester.

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 theater. Second half of course will
involve a study of other legal problems in the
entertainment industry, including misappropriation,
protection of titles and characters, and the rights of
writers and publicists.

297. Client Interviewing and Counseling (2) II. Smith
Discussion—2 hours. Course uses a series of role-
playing exercises and class discussions to introduce
students to a set of non-trial skills basic to the prac-
tice of law. Course concentrates on client interview-
ing and counseling but also includes exercises in
written communications, negotiation, drafting of
pleadings, and hearings. Limited enrollment. (SU grading only.)

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. Plan and conduct weekly seminar and
programming subject to the following regu-
lations: (1) the program may extend over no more than
two semesters; (2) the plan for the program and the
list of members of the group must be submitted to
Dean's Office at least 4 weeks prior to opening of the
semester in which the program is to begin; (3) the
three-member faculty board will be appointed for
each group proposed and will have authority to
approve or disapprove the program and the amount of
credit sought; (4) changes in the program or in
control 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
attended by them; (6) each member of the group
must submit an individual paper and an alternative
growing out of the seminar subject to the faculty
board; (7) 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 will be under the super-
vision of a faculty member (normally, no faculty
member will be permitted to supervise more than five
students working on individual programs during any

NOTE: For key to footnote symbols, see page 133.
semester); (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) student must submit an individual paper or approved alternative to the supervising faculty member. (SU grading only)

Professional Courses

410A. Appellate Advocacy (Moot Court) (1) I. Perschbacher
Program includes classroom instruction in appellate procedure and appellate advocacy skills and participation in the moot court program. Participants in 410A must complete all oral advocacy problems and argue six times before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (SU grading only)

410B. Appellate Advocacy (Moot Court) (1) II. Perschbacher
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)

413. Interschool Competition (1-3) I. II. The Staff
Prerequisite: permission of the appropriate faculty adviser. Participation in interscholastic moot court and lawyering skills competitions. Enrollment is limited to students actually representing the School in the interscholastic competitions. Competitors must be authorized by the appropriate faculty adviser. The faculty adviser may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (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)

415. Trial Practice Honors Board (1) I. Iwnicki-Elrod
Members of the Trial Practice Honors Board administer the Trial Practice II course. Students may receive one credit for service on the Board. Credit is awarded upon approval of faculty adviser. (SU grading only)

416. Law Review Writer (1-2) I and II.
Writing of an editorship quality law review article under the editorial supervision of editors of the Law Review. Minimum of 40 hours contribution to the Law Review publication is also required. Credit may be obtained only upon achieving status as a member of the Law Review, which requires that the student have made substantial progress toward completing an editorship article. Credit is awarded only after certification by the Editor-in-Chief of the Law Review and approval of the faculty advisers to the Law Review. One unit of credit is earned the first semester. Two units are earned the second semester upon completing an editorship draft. One unit is earned second semester if only a membership draft is completed. (SU grading only)

417. Law Review Editor (2) I, II. The Staff
Edits and completes an editorship article and must perform editorial duties requiring a substantial time commitment. Credit is awarded only after certification by the Editor-in-Chief of the Law Review and the approval of the faculty advisers to the Law Review. Editors of the Law Review may receive two units for each semester of service as an editor, up to a maximum of four units. (SU grading only)

418. Environments (1) I, II. The Staff
The Editor-In-Chief of Environments may receive one credit for each semester of service. Credit must be approved by the faculty adviser to Environments. 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 individual project. Requires intensive individual effort of at least 20 typewritten, double-spaced pages, excluding footnotes. Project may take any of several forms, for example, a paper, a brief, a memo- randum of law, or at least a set of guidelines for a statute or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). Advanced writing project may also be completed by attending with another student a 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 on the scope of the writing effort. (Grading may be on SU or letter-grade basis at the faculty supervisor's discretion.)

420. Individual Clinics (2-12) I. II. The Staff
Individual Clinical Program—4 hours (1 unit) to full time (12 units) per semester. Program is designed to provide practicing attorneys and public agency of student's choice with available of Clinic Committee and under sponsorship of faculty member; relevant substantive and procedural law as recorded by the Court. Clinical work shall be under appropriate legal supervision and designed to maximize educational benefits. Students arranging individual clinicals in subject matter areas covered by Formal Clinical Programs (e.g., Criminal Justice, Employment relations, legislative, immigration) must enroll in the Formal Clinical Program and attend the required seminars (see courses 234, 440, 455, 470). With exception of a clinical semester away, students may enroll in no more than 6 units in any one semester or any one clinical placement. With a full time clinical semester away, one course may be taken at 2 units per semester with the consent of Dean (14 semester units maximum total). For complete description of policies and procedure governing the design, approval, requirements and limitations of individual clinicals (e.g., "Clinical Guidelines") obtainable from Dean's Office or Clinical office. (SU grading only). (Completed application and confirming letter from clinical placement must be submitted to Clinical Office one month prior to beginning of semester in which credit is requested.)

425. Judicial Clinicals (2-12) I. II. The Staff
Clinical Program—to be arranged. Prerequisite: relevant substantive courses recommended. Students may arrange individual judicial clerkship clinical with state and federal judges of their choice with the approval of the Clinic Committee. Arrangement of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinics.

440. Clinical Program in Immigration Law (2-12) I. II. Smith
Discussion—2 to 12 hours. Client clinic course will include a seminar on immigration law practice, individual consultation, 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 12. Students come four hours 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 office hours per week. (For purposes of this course, "environmental law" includes land use control by public means.) Students will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experiences. Participation in occasional meetings of students enrolled in program. (SU grading only)

455. Clinical Program in Employment Relations (2-12) I. II. West
Clinical Program. Prerequisite: prior or concurrent enrollment in courses 251 or 260 or consent of instructor. Practical experience in employment relations: private and public sector labor law, or employment discrimination. Student 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. Emphasis on emphasis on participation in actual research, 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. Gandara
Clinic—2 to 6 hours. Prerequisite: course 225 (may be taken concurrently) or consent of instructor. For students interested in a work experience in an administrative law setting. Students will work under the direct supervision of an administrative law judge, hearing officer, or government attorney. Placement assistance prior to program initiation. Emphasis is on emphasis on participation in actual research, informal adjudication, informal adjudication, rulemaking, and judicial review. Students will be required to report monthly as a group to share experiences and maintain observational journals. (SU grading only)

470. Clinical Program in the Administration of Criminal Justice (2-12) I, II. Ruemmler
Clinical Program. Prerequisite: courses 219, 227 and 283A recommended. This program affords students the opportunity to gain practical experience working for a consultant 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 factual investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Journal and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (SU grading only)

495. Instruction in Legal Research and Writing Skills (2-12) I. Bernhard; II. Bernhard, Johns
Participants will assist in conducting legal research and writing for first-year students under the direction of the legal research and writing instructors. Approval of the research and writing instructors is required for enrollment. Participants may register 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)

Robert Varianlin, Jr., Ph.D., Program Director
Program Office, 922 Sproul Hall (916-752-9983)

Committee in Charge

Wibul A. Benware, Ph.D. (German)
Caroline Herton, D.Litt. (German)
Maria I. Manea-Manioli, Ph.D. (French)
Almerindo E. Ojeda, Ph.D. (Spanish)
Lenora A. Timm, Ph.D. (Linguistics)
Robert Varianlin, Jr., Ph.D. (Linguistics)
David P. Wilkins, Ph.D. (Linguistics)
Aram Yeghsayan, Ph.D. (Anthropology)

NOTE: For key to footnote symbols, see page 133.
Maxim Adviser, W.A. Benware.

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.

UNITs

Linguistics 1, 109, 139, and 140, . . . 16 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 Chairman of the Linguistics Group.

Graduate Adviser, A. E. Ojeda.

Courses in Linguistics

Lower Division Course

1. Introduction to Linguistics (4) II, III, Henton, Benware, Wilkins

Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. General Education credit: Civilization and Culture/Introductory.

10. Elementary American Sign Language (5) I. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to American Sign Language grammar and vocabulary, with emphasis on conversational skills.

11. Elementary American Sign Language (5) II. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 10. Continuation of course 10.

12. Elementary American Sign Language (5) III. The Staff

Recitation—4 hours; discussion—1 hour. Prerequisite: course 11. Continuation of course 11.

Upper Division Courses

*100. Languages of East Asia (4) II. Wallacker

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of languages and language families of East Asia, their natures and distributions.

102. Historical Linguistics (4) II. Wilkins

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 100. Description and analysis of the historical study of language; sound change, morphological change, syntactic change, semantic change.

109. Phonetics (4) I. Henton

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) III. Timm, Henton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Investigation of real and putative (stereotyped) sex-linked differences in language structure and usage, with an eye to the social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Linguistics 1 or Anthropology 4.

115. Chicano Sociolinguistics (3) II. Timm

Lecture—3 hours. Prerequisite: course 1 and Spanish 3 or the equivalent. Study of the varieties of Chicano Spanish spoken in the Southwest; patterns of Spanish–English bilingualism; attitudes toward Spanish and English; Chicano Spanish and the schools. Offered in odd-numbered years.

120. Semantics (4) I. Wilkins

Lecture—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) II. Jaeger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1.Optional. Introduction to psycholinguistic issues relating to language and to the implications of research in psychology for linguistic theory.

138. Language Development (4) III. Jaeger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of the 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. Henton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to and application of phonological theory.

140. Grammatical Analysis (4) I. VanValkin, Wilkins

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 the formal aspects of the theoretical framework to be employed.

150. Contrastive Analysis of Spanish and English (4) III. Timm

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Spanish 3 or the equivalent. Comparisons of the linguistic structures (phonology, morphology, and syntax) of Spanish and English; learning problems of both native Spanish and native English speakers will be considered. Offered in even-numbered years.

165. Introduction to Syntactic Theory (4) II. VanValkin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to syntactic theory, primarily through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and theory building.

169. Current Theories of Syntax (4) IV. Ojeda, VanValkin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Examination of major contemporary theories of syntax.

170. Language Universals and Typology (4) III. VanValkin, Wilkins

Lecture—3 hours; term paper. Prerequisite: course 165. A term paper may be taken concurrently. Investigation into common features of all human languages and the classification of languages in terms of their structural features; theories of universal grammar; detailed discussion of a non Indo-European language and 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 member of a language family or area. May be repeated for credit.

175. Biological Basis of Language (4) III. Drorakers

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Consent of instructor. Introduction to the field of neurolinguisitics and techniques used to explore representation of language in the human brain.

182. Internship in Linguistics (1-12) I, II, III. The Staff (Timmer in charge)

Internship—3-36 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applies linguistic-related skills to a fieldwork project in areas such as the media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/N grading only.)

194H. Special Study for Honors Students I-5 I, II, III. The Staff (Director in charge)

Individual study—1-15 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
Prerequisite: upper division standing with Linguistics major and a Bachelor's degree. 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 (1-6) I, II. The Staff
Chairperson: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Next/Valin in charge)
(P/NP grading only.)

Graduate Courses

200. Principles of Historical Linguistics (4) III. Manea-Manoliu, Wilkins
Lecture—3 hours; term paper. Prerequisite: course 102. Advanced treatment of the theory and methods of historical linguistics. Offered in even-numbered years.

209. Advanced Phonetics (4) II. Henton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 108. Development of the physiological basis of speech articulation and an introduction to acoustic phonetics. Offered in odd-numbered years.

210. Advanced Semantic Theory and Analysis (4) II, Wilkins
Lecture—3 hours; term paper. Prerequisite: course 120, 140. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in odd-numbered years.

*215. Computational Linguistics (4). The Staff
Lecture—1 hour; term paper. Prerequisite: course 165 or consent of instructor; course 120 recommended. Applications of computers and the computational paradigm to the analysis and description of the syntax and semantics of language. Models of human performance in the use of language. Offered in odd-numbered years.

220. Romance Linguistics (4) II. Manea-Manoliu
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 modern Romance languages. Option of focus on phonology, syntax, or historical linguistics.

*225A. Modern Linguistic Theory: Structuralism (4) II. VanValin
Lecture—3 hours; term paper. Prerequisite: course 139, 140. Survey of the development of structural linguistics from de Saussure to the 1950s. Offered in even-numbered years.

*225B. Modern Linguistic Theory: Generative Grammar (4) III. VanValin, Ojeda
Lecture—3 hours; term paper. Prerequisite: courses 139, 136. Survey of the development of generative grammar and its offshoots from the 1950s to the present. Offered in even-numbered years.

239. Advanced Phonological Theory and Analysis (4) III. Henton
Lecture—3 hours; term paper. Prerequisite: course 139. Critical overview of current phonological theories. Offered in odd-numbered 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 approval of instructor. Introduction to current research in various aspects of linguistics.

265. Advanced Syntactic Theory and Analysis (4) III. Van Valin
Lecture—3 hours; term paper. Prerequisite: course 140. Critical examination of contemporary theories of syntax, with concentration on functionalist theories. Offered in odd-numbered 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. Contributions of col locational disciplines—psycholinguistics, sociolinguistics, and cognitive psychology—to English as a second language instruction.

281. Research on Second Language Acquisition (4) II. Marino
Lecture—2 hours; laboratory—1 hour; term paper; computer projects. Prerequisite: upper division or graduate standing. Analysis of theory/research on L2 acquisition. Topics include: contrast of L1/L2 acquisition; cognitive theories of L2 such as the natural order and input hypotheses, as well as effects of individual variation, cognition, motivation on L2; research design and basic statistical analyses.

282. Individual and Social Aspects of Bilingualism (4) II. Timm
Lecture—3 hours; term paper. Broad overview of bi- and multilingualism, with focus on theoretical and descriptive research; topics covered range from language processing in bilinguals to code-switching to language as a political issue in multilingual states.

297T. English as a Second Language Teaching/Tutoring (4) III. Schwabe
Clinic—4 hours; Seminar—4 hours. Prerequisite: course 300, English 302 and 303 (may be taken concurrently). Teaching classes for ESL graduate students in the UC Davis ESL clinic in pronunciation, listening, reading, writing, etc.; assisting the ESL under-graduate comprehensive 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 (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (VanValin in charge)
(SU grading only.)

Professional Course

300. The Teaching of English as a Foreign Language (4). Schwabe
Lecture—3 hours; laboratory—3 hours. Prerequisite: English 161A or course 109 or consent of instructor. Methods of teaching English to non-native speakers, stressing particularly recent terminology and methodology.

Linguistics (A Graduate Group)

Robert VanValin, Jr., Ph.D., Chairperson of the Group (916-752-7555)
Group Office, 922 Sprout Hall (916-752-9933/1219)
Faculty. The Group includes faculty from eleven departments in the College of Letters and Science.

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. degree. There are two tracks within the program, one concentrating on applied linguistics and TESOL, and the other on general linguistics. Within the general linguistics track, the following areas are emphasized:

(a) theoretical linguistics, (b) sociolinguistics, (c) child language development, (d) psycholinguistics, (e) neurolinguistics, and (f) linguistic description (contemporary or historical) of a particular language or group of languages.

In general, the M.A. in Linguistics at UC Davis 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 language 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 complete the following courses in Linguistics from the undergraduate program: 109 (phonetics), 102 (historical linguistics), 120 (semantics), 139 (phonological analysis), 140 (grammatical analysis), and 165 (introduction to syntactic theory).

Requirements. The requirements for the two tracks differ. The track in applied linguistics and TESOL operates under the Plan II program. Thirty-six units of upper division and graduate course work above and beyond the prerequisite courses listed under Preparation (above) are required, and at the end of the course work a student must pass a written comprehensive examination. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper division and graduate course work above and beyond the prerequisite courses must be completed, and a thesis is required. Students in both tracks must pass a foreign language reading examination.

Graduate Adviser. A. E. Ojeda (Spanish).

Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

Chinese

10. Modern Chinese Literature
*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
108A-I. Topics in Chinese Literature (in English)

Classics

140. Homer and Ancient Epic
*141. Greek and Roman Comedy
*142. Greek and Roman Novel
143. Greek Tragedy

Comparative Literature

1. Great Books of Western Civilization: From Myth to Faith
2. Great Books of Western Civilization: From Faith to Reason
3. Great Books of Western Civilization: The Modern Crisis
*4. The Short Story and Novella
5. Fairy Tales, Fabes and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
10A-N. Master Authors of World Literature
12. Introduction to Women Writers
*14. Dramatic Literature
15. The Spiritual Quest
20. Man and the Natural World
25. Ethnic Minority Writers in World Literature
*53A. Literature of China and Japan
*53B. Literature of India and Southeast Asia
135. Women Writers
140. Thematic and Structural Study of Literature
141. Literary Theory and Criticism
*145. Representations of the City
146. Myth in Literature

NOTE: For key to footnote symbols, see page 133.
Management, School of

Robert H. Smiley, Ph.D., Dean
School Office, 308 Voorhies Hall (916-752-7362)

Faculty

- Jack Barbash, Ph.D., Visiting Professor
- Nicole W. Biggart, Ph.D., Associate Professor (Management Science and Engineering)
- George Bittlingmeyer, Ph.D., Associate Professor
- David S. Burch, Ph.D., Assistant Professor
- Richard J. Castellanos, Ph.D., Associate Professor
- Peter Clark, Ph.D., Professor
- Richard C. Dorf, Ph.D., Professor (Management, Electrical and Computer Engineering)
- George Frankel, J.D., Lecturer (Management, Law)
- Paul A. Griffin, Ph.D., Professor
- Michael Hagerty, Ph.D., Associate Professor
- Michael Maher, Ph.D., Professor
- Alexander F. McCalla, Ph.D., Professor (Agricultural Economics)
- David M. Rocke, Ph.D., Professor
- Arthur M. Sullivan, Ph.D., Associate Professor (Management, Economics)
- Jerome J. Sussman, B.S., Ph.D. (hon.), Senior Lecturer (Management, Electrical and Computer Engineering)

NOTE: For key to footnote symbols, see page 133.

Courses in Management

Lower Division Course

100. Introduction to Financial Accounting (3)

Griffin

Lecture—3 hours. Prerequisite: no prior 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)

201A. Financial Accounting and Reporting (3)

Griffin

Lecture—3 hours. Introduction to the basic principles of accounting, financial reporting and policy, with special attention to the preparation and analysis of financial statements. Topics include income measurement and valuation, assets and liabilities, owners' equity and intercorporate investments.

201B. Management Accounting and Control (3)

Maher

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 investment decision making.

202. Organizational Behavior (3)

Bogart

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to the analysis of social processes within organizations. Topics include group dynamics, informal relations, leadership, socialization processes, power and conflict, goal setting, decision making, and organizational culture. Consideration of alternative theoretical models.

203. Organization Theory (3)

The Staff

Lecture—3 hours. Prerequisite: 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 I (3)

Sullivan

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 204. Continuation of course 204. Analysis of factors behind the supply of and demand for capital and labor. Examination of market efficiency, externalities, 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 of policies and programs. Methodologies employed include experimental, 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)

The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 204, 205. Intertemporal allocations of scarce resources by individuals.
208. Marketing Management (3) Hagerty
Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Marketing management processes, opportunities, environment, 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) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduces student to computer, develops programming and data handling skills. Studies use of computer in organizations, emphasis on managerial aspects of computing. Topics include standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security.

210A. Statistics for Management (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Survey of statistical methods. Emphasis on managerial decision making. Descriptive statistics, sampling, statistical inference, hypothesis testing.

210B. Statistics for Management (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor, courses 209A and 210A. Regression analysis and time series. Stress applications of techniques to problems in public and private finance.

211. Quantitative Analysis for Decision Making (3) Bunch
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. Stress applications of decision analysis in public and private administration.

(Second-Year Courses)

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

215. Law and Legal Process (3) The Staff
Lecture—3 hours. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamental principles of administrative law, fundamentals of business law.

220. Public Budgeting and Finance (3) The Staff
Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economic and political factors of taxation and resource allocation; intergovernmental financial relations; budgeting activities of local governments.

224. Human Resources Management (3) Biggart
Lecture—3 hours. Problems of recruitment, training, motivating, and compensating and separating workers in contemporary organizations. Topics include design of incentive systems, career management, professionalization, alienation, worker burnout, organizational deviance, and current issues such as affirmative action and the unionization of public employees.

225. Labor Relations (3) Barbash
Lecture—3 hours. Course deals with labor organization, employment relationships, employee negotiations, contracts, and legislation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

228. Statistical Quality Control and Productivity Improvement (3) Bunch
Lecture—3 hours. Prerequisite: courses 210A and 210B or 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. Regulation and Public Policy (3) The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Course emphasizes technical, economic, and social dimensions of regulation. Emphasis on costs and benefits of regulation to society. Special problems include pollution control, antitrust, consumer protection, and other public policy issues.

231. Intergovernmental Systems and Administration (3) The Staff
Lecture—3 hours. Intergovernmental dimensions of policy analysis, particularly how policies of higher levels of government shape public actions at all levels of government. Emphasis given to grants and contracts, regulations, fiscal policies, technical assistance, and to various substantive policy areas.

232. Urban Policy and Planning (3) The Staff
Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

233. Regulation and Policy in Agriculture (3) The Staff
Lecture—3 hours. Implications for management of regulation and public policy on agricultural production and marketing. Emphasis on governmental influence on the implementation of marketing strategies.

234. Urban Economics and Real Estate (3) The Staff
Lecture—3 hours. Applies economic reasoning to managerial decisions concerning the siting of firms and public agencies. Examines institutional setting and alternative strategies for real-estate finance and development. Examines impact of public policy on location decisions of firms.

240. Management Information Systems (3) Suran
Lecture—3 hours. Integrative examination of managing the total organizational enterprise. Missions, objectives, strategies, policies, measurements and controls. Case study.

241. Managerial Decision Making (3) Bunch
Lecture—3 hours. Develops analytical skills for evaluating decisions and solving problems in various managerial settings. Emphasis is on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

242. Competitive Analysis (3) Bunch
Lecture—3 hours. Applies quantitative and behavioral tools to analyzing competitive pain. Emphasis on applying competitive analysis to predicting competitors' actions and pricing, bidding, and bargaining situations. Course considers aspects of negotiations in labor relations, arbitration, mergers, and acquisitions.

243. Risk Management (3) The Staff
Lecture—3 hours. Analyzes managerial problems in which uncertainty and risk are crucial elements in decision making. Problem areas include societal risks, insurance, financial investments, hedging, and new ventures. Course develops a unified framework for analyzing risk in various contexts.

244. New and Small Business Ventures (3) Dorf
Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative stage. The business plan. Legal forms, financial considerations, the management team, the entrepreneur. Students develop a detailed business plan.

246. Marketing Strategies (3) Hagerty
Lecture—3 hours. Exercises process by which organizations develop strategic marketing plans. Includes definition of objectives and strategies, market analysis, developing market opportunities, design of new products, and marketing management planning function. 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.

251. Technology Management (3) Dorf

251. Management of Innovation (3) Suran

252. Production and Operations Management (3) The Staff
Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queueing, and network models.

260. Financial Management (3) Castanias
Lecture—3 hours. Emphasizes 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 structures.

261. Investment Analysis (3) Johnson
Lecture—3 hours. Examines 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) The Staff
Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, other obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulations, and specific market practices.

263. Options and Futures Markets (3) Johnson
Lecture—3 hours. Studies the behavior of options and futures markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, other commodity futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) The Staff
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

265. Theory of Financial Decision Making (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

266. International Finance (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

270. Corporate Financial Reporting (3) Griffith
Lecture—3 hours. Analysis and evaluation of contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policy makers.
271. Accounting and Budgeting for Management Control (3) The Staff Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) Griffin Lecture—3 hours. Studies how investors, creditors, and others use accounting and other information in making rational investment, lending, and decision-making. 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) The Staff Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies.

274. Auditing, Internal Control, and Public Accounting (3) The Staff Lecture—3 hours. Concentrates on the role of the independent public accountant as auditor and consultant, from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also placed on current issues confronting the accounting profession.

280. Data and File Management (3) Topkis Lecture—3 hours. Concepts of information storage and retrieval on digital computer media. Emphasis is on file structures and their uses within organizations; applications drawn from both the public and private sector.

281. Systems Analysis and Design (3) The Staff Lecture—3 hours. Design and specification of computer-based information systems. Applications of systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation.

282. Discrete System Simulation (3) The Staff Lecture—3 hours. Prerequisite: course 280. Computer simulation of discrete dynamical systems under uncertainty; topics include model building, computer implementation, output interpretation, and sensitivity analysis. Applications to managerial decision problems stressed.

283. Optimization Theory and Applications (3) Topkis Lecture—3 hours. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; transportation, network, and large-scale systems; and computer implementation. Applications are made to problems in private and public management.

284. Applied Linear Models for Management (3) The Staff 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) Wecker Lecture—3 hours. Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control.

286. Telecommunications and Computer Networks (3) Topkis Lecture—3 hours. Prerequisite: course 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environments; local area networks; data security in computer networks.


288. Special Topics in Management Information Systems (3) Topkis Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation.

289. Computer Concepts and Software Systems (3) The Staff Lecture—3 hours. Prerequisite: course 280. Fundamental concepts of computer operation, including computer architecture, machine language and assembly language, operating systems, and the operating environment for applications programs. Emphasis on microcomputer systems with managerial applications.

290. Seminar in Management (3) Seminar—3 hours. Interdisciplinary case study of a real business or government enterprise.

291. Directed Group Study (1-5) The Staff Prerequisite: consent of instructor.

292. Individual Study (1-12) The Staff Prerequisite: consent of instructor. (S/U grading only)

Master of Education (M.Ed.) (A Graduate Group)
James Griswold, Ph.D., Chairperson of the Group
Group Office, 103 AEB (916-752-4380, mornings only)

Faculty, This interdisciplinary graduate group consists of faculty from departments such as Agricultural Engineering, Agronomy and Range Science, Animal Science, Applied Behavioral Sciences, Community Health, Consumer and Environmental Design, Environmental Horticulture, Nutrition, Plant Science, and Textiles and Clothing.

Graduate Study, The Master of Education Graduate Group is housed in the Department of Applied Behavioral Sciences. Areas of study include: health education planning; community services planning and program management; community education; international development education; program design and evaluation; organizational decision making; leadership development, communication, and change; extension education; environmental education; youth; non-formal education; agricultural development education; and consumer behavior. Generally, Master of Education (M.Ed.) degree students are preparing for leadership and professional roles in education and development education related to planning, organizational change, and evaluation.

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 the field of study and/or statistics. Students submit a Program of Study Plan in the area of concentration by the end of the first quarter of graduate study. A field project and comprehensive oral examination are required for completion of this degree.

Mathematics (College of Letters and Science)
Arthur J. Kremer, Ph.D., Chairperson of the Department
Dallas O. Banks, Ph.D., Vice-Chairperson of the Department (Student Affairs)
Sherman K. Stein, Ph.D., Vice-Chairperson of the Department (Graduate Affairs)
Department Office, 665 Kerr Hall (916-752-8027)

Faculty
211. Henry L. Alder, Ph.D., Professor
212. Hubert A. Arnold, Ph.D., Professor Emeritus
213. George A. Baker, Ph.D., Professor Emeritus
214. Dallas O. Banks, Ph.D., Professor
215. David W. Barnett, Ph.D., Professor Emeritus
216. Donald C. Benson, Ph.D., Professor Emeritus
217. Carlos R. Borges, Ph.D., Professor
218. Robert J. Buck, Ph.D., Associate Professor Emeritus
219. Albert C. Burdette, Ph.D., Professor Emeritus
220. G. S. Chakravarti, Ph.D., Professor Emeritus
221. Angela Y. Cheadle, Ph.D., Associate Professor
222. Doyle C. Cuff, Ph.D., Professor Emeritus
223. John E. Diederich, Ph.D., Professor Emeritus
224. Allan L. Edelson, Ph.D., Professor Emeritus
225. Curtis M. Fulton, Ph.D., Professor Emeritus
226. Robert D. Glaub, Ph.D., Professor Emeritus
227. Joel Hass, Ph.D., Assistant Professor Emeritus
228. Charles A. Hayes, Jr., Ph.D., Professor Emeritus
229. Frederick A. Howes, Ph.D., Professor Emeritus
230. John K. Hunter, Ph.D., Professor
231. Kurt Kreith, Ph.D., Professor
232. Arthur J. Kremer, Ph.D., Professor Emeritus
233. Melvin R. Krom, Ph.D., Professor Emeritus
234. Gary J. Kuroski, Ph.D., Professor Emeritus
235. David G. Mead, Ph.D., Professor Emeritus
236. E. O. Milton, Ph.D., Professor
237. Motokico Mulashe, Ph.D., Visiting Associate Professor
238. Donald A. Norton, Ph.D., Professor Emeritus
239. Nikolaos S. Papageorgiou, Ph.D., Assistant Professor Emeritus
240. Chan Y. Rea, Ph.D., Professor Emeritus
241. G. Thomas Salie, Ph.D., Professor Emeritus
242. Elwyn M. Silvia, Ph.D., Professor Emeritus
243. Sherman K. Stein, Litt.D., (Hon.), Ph.D., Professor Emeritus
244. Robert W. Stringall, Ph.D., Professor Emeritus
245. Takayuki Tamura, D.Sc., Professor Emeritus
246. J. B. Temple, Ph.D., Associate Professor
247. Abigail Thompson, Ph.D., Assistant Professor Emeritus
248. Craig A. Tracy, Ph.D., Professor
249. Edward J. Tully, Jr., Ph.D., Associate Professor Emeritus
250. Howard J. Wein, Ph.D., Professor Emeritus
251. Roger J. Wits, Ph.D., Professor Emeritus

The Major Programs
Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. The latter is especially recommended for students who intend to pursue mathematics at the graduate level. Under either degree program the student may prepare for various careers by an appropriate choice of elective courses.

Developing an ability to think and communicate in mathematical terms is the basic objective of both bachelor degree programs. This ability requires familiarity with the concepts and techniques of various branches of mathematics and is necessary for graduate study in mathematics as well as the successful pursuit of mathematics-oriented careers. In particular, mathematics is an essential tool for people working in the physical sciences, and mathematics is now being widely applied to studies in the biological and social sciences as well. Students with career oriented programs in applied mathematics should supplement their mathematics curriculum with courses in other departments which provide background in their proposed area of application.

Mathematics provides an excellent background for entry into the Schools of Administration, Law,
A.B. Major Requirements:

Preparatory Subject Matter

Mathematics 11 or (high school equivalent) 0.5
Mathematics 21A, 21B, 21C, 22A, 22B 0.5
Mathematics 36 0.5
Computer Science Engineering 30 0.5
Core Requirements

Mathematics 100 0.5
Mathematics 127A, 127B 0.5
Mathematics 150A, 150B 0.5
Choose one Track from the following 0.5

Track 1: Secondary Teaching

Mathematics 115A 0.5
Mathematics 141 0.5
Additional upper division units 0.5

Track 2: General Mathematics

Mathematics 100 0.5
Mathematics 127A, 127B 0.5
Mathematics 150A, 150B 0.5
Choose one Track from the following 0.5

Track 1: Preparation for Graduate Study in Mathematics

Mathematics 127C 0.5
Mathematics 160C 0.5
One course from Mathematics 125, 126, 147 0.5
Additional upper division units 0.5

Track 2: Applied Mathematics

Mathematics 187 0.5
Two courses from Mathematics 128A, 128B, 128C 0.5
Additional upper division units 0.5

B.S. Major Requirements:

Preparatory Subject Matter

Mathematics 11 or (high school equivalent) 0.5
Mathematics 21A, 21B, 21C, 22A, 22B 0.5
Computer Science Engineering 30 0.5
Mathematics 22C (Tracks 1 and 2 only) 0.5
Mathematics 22C or 36 (Tracks 3 and 4 only) 0.5
Physics 9A, 9B, 9C, 10A (Tracks 1 and 2 only) 0.5
Physics 9A (Track 3 only) 0.5
Statistics 13A or 10C (Track 4 only) 0.5
Core Requirements

Mathematics 100 0.5
Mathematics 127A, 127B 0.5
Mathematics 150A, 150B 0.5
Choose one Track from the following four 0.5

Track 1: Preparatory for Graduate Study in Mathematics

Mathematics 127C 0.5
Mathematics 160C 0.5
One course from Mathematics 125, 126, 147 0.5
Additional upper division units 0.5

Track 2: Applied Mathematics

Mathematics 187 0.5
Two courses from Mathematics 128A, 128B, 128C 0.5
Additional upper division units 0.5


Courses in Mathematics

Lower Division Courses

B. Elementary Algebra (no credit). The Staff Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if qualified number of students enroll. Not open to Concurrent student enrollment. (P(NP grading only). There is a fee of $45.)

C. Trigonometry (no credit) I, II. The Staff Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P(NP grading only). There is a fee of $32.)

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.)

11. Analytic Geometry (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open to students who have received credit for course 21A.

16A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination. Functions, limits, continuity, slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphic, extraneous of a function. Differentiates. L'Hopital's rule. Only two units of credit may be applied toward a degree. Not open to students who have received credit for course 21A.

21A. Calculus (4) I, II, III. The Staff Lecture-discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11, and obtaining required score on Precalculus Qualifying Examination. Functions, limits, continuity, slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphic, extraneous of a function. Differentiates. L'Hopital's rule. Only two units of credit may be applied toward a degree. Not open to students who have completed course 16A. (CAN Math 18)

21AH. Honors Calculus (4) I. The Staff Lecture-discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A.

21B. Calculus (4) I, II, III. The Staff Lecture-discussion—4 hours. Prerequisite: course

NOTE: For key to footnote symbols, see page 133.
127A-127B/127C. Advanced Calculus (4-4-4) I-II-III.
The Staff
Lecture—3 hours; extensive reading and problem solving.
Prerequisite: courses 22A, 22C; course 108 (may be taken concurrently with consent of instruc-
tor). Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of conver-
gence.

128A. Numerical Analysis (4) I.
The Staff
Lecture—3 hours: term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Min-
imization of functions of several variables. Simulta-
near linear equations. Eigenvalue problems.

128B. Numerical Analysis in Differential Equa-
tions (4) II. The Staff
Lecture—3 hours; term project. Prerequisite: courses 21C and 22A; knowledge of a programming lan-
guage such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Mini-
mization of functions of several variables. Simultane-
near linear equations. Eigenvalue problems.

131. Methods of Mathematical Probability (4) II.
The Staff
Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; dis-
crete, continuous distributions; random variables; joint, marginal conditional densities; transformation;
expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability mod-
els via conditioning; tables. Students who have had Statistics 131A may not receive credit for this course.

132A-132B. Introduction to Stochastic Processes (3-3) III.
The Staff
Lecture—3 hours. Prerequisite: course 131 or Statis-
tics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queuing theory, Brownian motion, stationary processes. Course 132B is offered in even-numbered 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 particu-
ar, a discussion of its relation to other geometries.

145. Combinatorial Mathematics (3) III.
The Staff
Lecture—3 hours. Prerequisite: course 108. Combi-
natorial methods using basic graph theory counting methods, generating functions, and recurrence relations.

147. Topology (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 108. Basic notions of point-set and combinatorial topology. Offered in even-numbered years.

130A-135B-155C. Introduction to Abstract Alge-
bra (4-4-4) I-II-III.
The Staff
Lecture-discussion—4 hours. Prerequisite: course 108. Basic concepts of groups, rings, and fields. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstraction.

160. Mathematical Foundations of Database The-
ory, Design, and Performance (3)
I. Diederich
Lecture—4 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 of physical database design and reorganization. Per-
formance via analytical modeling, simulation, and queuing theory. Block accesses; buffering; oper-
system contention; CPU intensive operations.

NOTE: For key to footnote symbols, see page 133.
164. Mathematical Foundations of Fifth Generation Computing (3) I, II. Institute
Lecture—3 hours. Prerequisite: course 108 and a modern high-level computer language. Study of the uses of predicate and various topics in knowledge-based systems. Resolution and non-resolution deductive, forward and backward deduction systems, logic programming, symbolic integration, problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

167. Linear Algebra and Applications (3) I, II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

168. Mathematical Programming (3) I, II. The Staff
Lecture—3 hours. Prerequisite: courses 21C, and 22A or 167; knowledge of a programming language. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization.

180. Special Topics: Pure and Applied Mathematics (2-3) I, II, III. The Staff
To be arranged by students and instructor. Prerequisite: course 22A-22B-22C or consent of instructor. Special topics from various fields of pure and applied mathematics. Topics selected based on mutual interests of students and faculty. May be repeated for credit in different subject areas.

185A. Functions of a Complex Variable with Applications (3) I, II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22C. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

*185B. Functions of a Complex Variable with Applications (3) 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. Ordinarily offered every year.

192. Internship in Applied Mathematics (1-3) I, II, III. The Staff (Chairperson in charge)
Work-learning experience; final report. Prerequisites: upper division standing; project approval by faculty sponsor. Supervised work-learning experience in applied mathematics. May be repeated for credit up to a total of 10 units. (P/NP grading only.)

194. Undergraduate Thesis (3) I, II, III. The Staff (Chairperson: consent of instructor. Independent research under supervision of a faculty member. Student will submit written report a thesis form. May be repeated with consent of Vice Chairperson. (P/NP grading only.)

197TC. Tutoring Mathematics in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—2-6 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education which involve the development of techniques for mathematics instruction and tutoring on an individual or group basis. (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
201A-201B. Real and Complex Analysis (4-4-4) I-II-III. Lecture—3 hours; discussion or paper (instructor's option). Prerequisite: course 127C or 203C. Abstract integration, Lebesgue measures, LP spaces, complex measures, bornological functions, Cauchy's theorem, Riemann mapping theorem, analytic continuation.

201D. Real and Complex Analysis (4) I. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 201C. Riemann mapping theorem and analytic continuation.

202A. Functional Analysis (4) I. The Staff (Chairperson in charge)
Lecture—3 hours; term paper. Prerequisite: course 201D. Introduction to topological vector spaces. Metrizability, Banach's theorem, the open mapping theorem, the closed graph theorem, the Hahn-Banach theorem. Duality and convexity. Weak topologies. Applications. Offered in odd-numbered 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) distribution and Fourier transforms and their applications to partial differential equations; (b) theory of bounded and unbounded linear operators and their spectral decomposition; (c) non-linear functional analysis. Offered in odd-numbered years.

203A-203B. Modern Applied Analysis (3-3-4-I-IV). The Staff
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Classical mathematical foundations leading to modern analysis. Linear and metric spaces; Hilbert space; operator theory. Applications to integral and differential equations. Variational methods.

203C. Modern Applied Analysis (3) I, III. The Staff
Lecture—3 hours. Prerequisite: course 203B. Applications to integral and differential equations. Variational methods.

204. Applied Analytic Geometry (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 203C. Analytic geometry of Euclidean spaces of any dimension and affording a minimum of geometric precision with the ability to apply analytic methods to problems in the physical sciences. May be repeated for credit.

201QA. Topics in Geometry: Discussion (1) I. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 201C (concurrent). Consent of instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210B. Topics in Algebra (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced algebra related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

210BL. Topics in Algebra: Discussion (1) I. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210B (concurrent). Consent of instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

210C. Topics in Analysis (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced analysis related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

210CL. Topics in Analysis: Discussion (1) I. The Staff (Chairperson in charge)
Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210C (concurrent). Consent of instructor. Special topics related to course 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

213A-213B-213C. Stochastic Dynamics and Applications (3-3-3-I-II-III). The Staff
Lecture—3 hours. Prerequisite: course 201C or 235C or consent of instructor. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, martingales, stochastic differential equations. Applications and advanced topics. Offered in odd-numbered years.

215A-215B-215C. Topology (4-4-4) I-II-III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in even-numbered years.

218A-218B. Partial Differential Equations (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 127C. Topics from the theory of partial differential equations and integral equations. Offered in odd-numbered years.

219A-219B. Ordinary Differential Equations (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 127C. Ordinary differential equations in the real and complex domains; existence and uniqueness theorems; linear systems; analysis of singular points; Sturm-Liouville theory; asymptotic expansions. Offered in even-numbered years.

221A-221B. Mathematical Fluid Dynamics (3-3) I-II. The Staff
Lecture—3 hours. Prerequisite: course 116B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous fluids. Offered in odd-numbered years.

225A-225B. Metamathematics (3-3) I-II. Kom
Lecture—3 hours. Prerequisite: course 126 or the equivalent. Axiomatizability, consistency, and completeness of the formalized mathematical theories; consistency in formal systems. Topics from the theory of models. Offered in even-numbered years.

228A-228B-228C. Numerical Solution of Differential Equations (3-3-3) I-II-III. The Staff

292A-299B. Numerical Methods in Linear Algebra (3-3) I-II. 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 odd-numbered years.

256A-256B-256C. Probability Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: course 127C and Statistics 151A-151B or the equivalent. Measure theoretic foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem. Conditional expectations; topics from discrete time Markov and stationary processes, ergodic...
theory, Brownian motion, weak convergence, Wiener and Poisson processes.

**240A-240B-240C. Differential Geometry (3-3-3) I-II-III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 116 or consent in Mathematics. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms, DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in odd-numbered years.**

**250A-250B-250C. Algebra (4-4-4) II-II-III. The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in Mathematics or consent of Instructor. Theory of groups, rings, and fields. Offered in odd-numbered years.**

**270. Foundations of Optimization (3) I. The Staff Lecture—3 hours. Prerequisite: course 205 or 127. Theory of linear and nonlinear programming: convexity, optimality conditions, duality, approximation, subdifferentiability. Goal is to acquaint student with the basic tools to derive optimality (and equilibria) for optimization problems in finite dimensions. Offered in odd-numbered years.**

**271. Dynamical Optimization (3) I. The Staff Lecture—3 hours. Prerequisite: course 203 or 127. Calculus of variations, optimal control, Pontryagin's maximal principle, optimality principle of dynamic programming. Goal is to provide student with the mathematical foundations of control theory and the calculus of variations. Offered in even-numbered years.**

**272. Numerical Optimization (3) II. The Staff Lecture—3 hours. Prerequisite: course 203 or 127. Unconstrained and constrained optimization, second order methods (Newton, quasi-Newton, sequential quadratic programming), large-scale optimization techniques, global optimization. Course goal is to acquaint students with the major techniques developed for optimization problems. Offered in even-numbered years.**

280. Topics in Pure and Applied Mathematics (1-3) I, II, III. The Staff Lecture—1-3 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 area.

290. Seminar (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.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

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 Courses**

300. A. 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.

**301A-301B. Mathematics Teaching Practicum (3-3-3) I-II. The Staff (Chairperson in charge) Laboratory—6 hours. Prerequisite: concurrent enrollment in course sequences 302 and 303 or consent of instructor. Specialist training in mathematics teaching. Required for advanced degrees in mathematics education. Sequence requires a strong undergraduate program in the mathematical sciences and may be repeated once for credit.**

**302A-302B. Curriculum Development in Mathematics (1-1-1) I-II. The Staff (Chairperson in charge) Lecture—1 hour. Prerequisite: concurrent enrollment in course sequence 303 or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. Course requires a strong undergraduate mathematics program. The sequence may be repeated once for credit with consent of instructor.**

**303A-303B. Mathematics Pedagogy (1-1-1) I-II. The Staff (Chairperson in charge) Lecture—1 hour. Prerequisite: concurrent enrollment in course sequence 302 or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods and the influences that shaped their development. The sequence may be repeated once for credit with consent of instructor.**

**390. Methods of Teaching Mathematics (3) I, II, III. The Staff Lecture—1 hour; discussion—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Proposed experiences: classroom teaching 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 departmental teaching assistants. May be repeated for credit. (SU grading only.)**

**Medical Microbiology**

See Medicine, School of

**Medicine**

See Medicine (School of); and Medicine (Veterinary Medicine)

**Medicine School of**

Hilbzer E. Williams, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
Edward C. Gomez, M.D., Ph.D., Associate Dean
Edward J. Hurley, M.D., Associate Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Loge, M.B.A., Associate Dean
Donal A. Walsh, Ph.D., Associate Dean
Jason R. Barr, M.Ed., Assistant Dean
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**Faculty**

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Juliet R. Aller, M.D., Assistant Professor (Human Anatomy)
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Timothy Albertson, M.D., Ph.D., Associate Professor (Internal Medicine, Pharmacology)

**NOTE:** For key to footnote symbols, see page 133.

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C. Robert Ashmore, Ph.D., Professor (Physical Medicine and Rehabilitation)
Alexander Barry, Ph.D., Professor Emeritus (Human Anatomy)
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Thomas P. Pledmlive, M.D., Assistant Professor in Residence (Internal Medicine)
George T. Rab, M.D., Professor (Orthopaedic Surgery)
Lawrence Rabnowitz, Ph.D., Professor (Human Physiology)
Antolin Raventos, M.D., Professor in Residence (Radiology)
Stanley B. Reich, M.D., Professor in Residence (Radiology)
Ted W. Reid, Ph.D., Professor in Residence (Ophthalmology)
Michael Reinhart, M.D., Associate Professor of Clinical Radiology (Clinical Radiology)
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. Rhein, M.D., Assistant Professor of Clinical Internal Medicine (Internal Medicine)
Mack Roach, M.D., Assistant Professor in Residence (Diagnostic Radiology)
Dick L. Robbins, M.D., Associate Professor (Internal Medicine)
John A. Robbins, M.D., Associate Professor of Clinical Internal Medicine (Clinical Internal Medicine)
David M. Robinson, M.D., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
Juan J. Rodrigo, M.D., Professor (Orthopaedic Surgery)
Carl J. Rosenquist, M.D., Professor (Radiology)
Alan M. Roth, M.D., Professor (Ophthalmology, Pathology)
Robert B. Rucker, Ph.D., Professor (Biological Chemistry)
Boleslaw Ruckman, M.D., Professor (Pathology)

NOTE: For key to footnote symbols, see page 133.
Raymond L. Teplitz, M.D., Professor (Pathology)
Henry Teitelbaum, M.D., Professor of Clinical Pathology
Seth Thaller, M.D., Assistant Professor in Residence (Surgery)
Jerald H. Theis, D.V.M., Ph.D., Professor (Medical Oncology, Pathology and Immunology)
Charles E. Tinkl, Ph.D., Assistant Adjunct Professor (Ophthalmology)
Durre E. Townsend, M.D., Professor (Obstetrics and Gynecology)
Robert R. Traut, Ph.D., Professor (Biological Chemistry)
Colin R. Tredrea, M.B.B.S., Assistant Professor of Clinical Anesthesiology (Anesthesiology)
John D. Treford, M.F.D., Professor (Obstetrics and Gynecology)
George Triadafilopoulos, M.D., Assistant Professor in Residence (Internal Medicine)
Joann M. Trolinger, M.H.S., Visiting Lecturer (Family Medicine)
Frederic A. Troy II, Ph.D., Professor (Biological Chemistry)
Walter True, M.D., Clinical Professor (Internal Medicine)
Francis Tao, M.D., Instructor in Residence (Internal Medicine)
John T. Tung, Ph.D., Professor (Biological Chemistry)
David L. Vail, Ph.D., Associate Adjunct Professor (Neurology)
Patrick L. Twomey, M.D., Associate Professor in Residence (Surgery)
David Vera, Ph.D., Assistant Adjunct Professor (Radiology)
Zakauddin Vera, M.D., Associate Professor (Internal Medicine)
Vijay K. Vijayan, M.D., Ph.D. Associate Professor (Human Anatomy, Neurology)
John Vogel, M.D., Senior Lecturer (Radiology)
Philip J. Vogt, M.D., Assistant Professor of Clinical Pathology (Pathology)
Carolyn S. Waggoner, M.S., Ph.D., Adjunct Lecturer (Internal Medicine, Nutrition)
Franklin C. Wagner, M.D., Professor (Neurological Surgery)
Barbara Walker, M.D., Instructor in Residence (Internal Medicine)
Donal A. Walsh, Ph.D., Professor (Biological Chemistry)
Robert M. Walter, Jr., M.D., Associate Professor (Internal Medicine)
Richard P. Williams, M.D., Professor (Medicine)
Richard E. Ward, M.D., Professor (Surgery)
Denis N. Waring, Ph.D., Assistant Professor in Residence (Human Physiology)
Donald V. Weir, M.D., Assistant Professor of Emeritus (Physical Medicine and Rehabilitation, Human Physiology)
Edward J. Watson-Williams, M.D., Professor Emeritus of Clinical Internal Medicine (Clinical Internal Medicine)
Phyllis G. Weiler, M.D., Professor of Clinical Community Health (Clinical Community Health)
Jeannine Weisborn, M.D., Assistant Professor in Residence (Internal Medicine)
Selton R. Wells, M.D., Ph.D., Professor Emeritus (Pathology)
David Wolfe, M.D., Professor of Clinical Anesthesiology (Anesthesiology)
Richard P. Weinberg, M.D., Professor (Pediatrics)
William Werner, M.D., Assistant Professor in Residence (Pediatrics)
Robert T. Wexler, Ph.D., Adjunct Professor (Neurology)
Theodore C. West, Ph.D., Professor Emeritus (Pharmacology)
Ronald G. Wheatly, M.D., Associate Professor in Residence (Anesthesiology)
Linda L. White, M.D., Associate Professor in Residence (Internal Medicine)
David A. White, M.D., Assistant Professor in Residence (Anesthesiology)
Linda L. White, M.H.S., Lecturer (Family Practice)
Richard H. Wiltse, M.D., Associate Clinical Professor (Internal Medicine)
Connie Whiteside, M.D., Associate Professor of Clinical Internal Medicine (Internal Medicine)

NOTE: For key to footnote symbols, see page 133.
ology, and a two-week required experience in responsibilities of medical practice (medical ethics, jurisprudence, medical economics). The fourth-year curriculum also allows for twelve weeks of undesignated time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute required courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for selecting electives during the first two years, particularly during the interim period between the first and second years.

First-Year Required Courses

Quarter I: Fall
Biological Chemistry 410A, molecular and cell biology.................4.5
Family Practice 400A, introduction to patient evaluation..............2
Human Anatomy 400, developmental, gross and radiologic anatomy.....9
Psychiatry 401, medicine and the mind........................................2
Quarter II: Winter
Biological Chemistry 410B, cell biology and metabolism................3.5
Human Anatomy 402, human microscopic anatomy.........................5
Human Physiology 400, human physiology.................................8
Family Practice 400B, introduction to patient evaluation...............2

Quarter III: Spring
Biological Chemistry/Human Physiology 418, mammalian endocrinology and homeostasis........4.5
Human Anatomy/Human Physiology 403, neurobiology..................5
Medical Microbiology 480A, basic and medical immunology..............2.5
Pathology 411, Pathology I..............................................................5
Family Practice 400C, introduction to patient evaluation.............2

Second-Year Required Courses

Quarter IV: Summer
Pathology 423, Pathology II..........................................................7.5
Obstetrics and Gynecology/Pediatrics 420, reproduction/perinatology.................................................................2
Dermatology 420, Integumentary system........................................2
Internal Medicine 400A, physical diagnosis................................1
Quarter V: Fall
Medical Microbiology 480B, pathogenic microbiology..................6.5
Internal Medicine 420A, hematopoietic and lymphoreticular system/nuclear medicine.................2.5
Orthopaedic Surgery 420, musculoskeletal system.........................2.5
Pharmacology 400A, Principles of Pharmacology A..........................2.5
Community Health/Internal Medicine 402, epidemiology/community health/occupational medicine.........................................................2.5
Internal Medicine 400B, physical diagnosis.................................2

Quarter VI: Winter
Pharmacology 400B, Principles of Pharmacology B..........................6
Internal Medicine 420C, respiratory system................................4
Internal Medicine 420D, cardiovascular system.............................3.5
Psychiatry 403, psychopathology.................................................3.5
Psychiatry 402, human sexuality...................................................1
Internal Medicine 400C, physical diagnosis................................2

Quarter VII: Spring
Internal Medicine 420F, metabolical-regulatory system..................3.5
Internal Medicine 420B, gastrointestinal system............................3
Internal Medicine/Biological Chemistry 419, basic third clinical nutrition.................................................................2
Internal Medicine 420E, nephrology................................................4
Neurology 420, neuromuscular pathology..................................4
Internal Medicine 400D, physical diagnosis.................................2

Third-Year Required Courses

Medical Sciences (core courses)

Professional Courses
430. Required Surgical Clerkship (12) I, II, III, IV.

Course Committee Chairperson:
Clinical Clerkship—full time (8 weeks).
Prerequisite: third-year medical student and approval by Committee on Student Evaluation and Promotion. Student required to take four weeks in General Surgery. Course also includes instruction in Anesthesiology.

431. Medicine Clerkship (18) I, II, III, IV.

Course Committee Chairperson:
Clinical experience—full time (12 weeks).
Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 2-week periods, one each at UCD Medical Center and at Martinez VA Hospital. Direct patient care situations under guidance of full-time or volunteer faculty member. Nights and weekend on-call. Completion of 24 full write-ups on patients for whom student will take special responsibility.

432A. Obstetrics-Gynecology Clerkship (12) I, II, III, IV.

Course Committee Chairperson:
Clinical experience—full time (6 weeks).
Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Obstetric/neonatal/gynecologic experience in delivery room, nursery wards, operating room, clinics. One-third of time spent in gynecology, two-thirds of time in perinatology.
Obstetrics, neonatology, and continuing care of fetus-neonate emphasized in perinatal period.
Seminars and conferences throughout period.

432B. Pediatric Clerkship (12) I, II, III, IV.

Course Committee Chairperson:
Clinical experience—full time (6 weeks).
Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Pediatrics emphasis on various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practice.
Diagotic, therapeutic, and interpersonal skills emphasized.

440. Responsibilities of Medical Practice (3) II.

Davidson and staff
Lecture-discussion—60 hours total.
Prerequisite: approval by Committee on Student Evaluation and Promotion.
Students will study the role of the physician in clinical practice, the health-care system, the patient, and the social and cultural issues arising in medical practice.

Fourth Year Requirements

Fourth-Year Required Courses

Responsibilities of medical practice..........................2 weeks
Physical Medicine and Rehabilitation clerkship......................2 weeks
Ear, Nose and Throat/Ophthalmology clerkships.......................4 weeks

Fourth Year Flexible Clerkships

Neurology and/or Neurosurgery..............................................4 weeks
Ambulatory Care.................................................................4 weeks
Clinical Selectives..............................................................8 weeks

The fourth-year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.).

Other Medical Sciences Courses

Professional Courses
450. Introduction to UCD Medical Center (1) I.

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) I.

Lecture—1 hour.
Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (SU grading only)

489. Directed Studies (9) IV. O'Grady

Independent study—40 hours total.
Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by Promotion Board. Independent studies to review pertinent material. Years I and II are in the curriculum in preparation for taking National Boards in the fall, and for remediation course work directed by the Promotion Board.

Other Medical Sciences Courses

Departmental Courses

Anesthesiology

Upper Division Course

192. Internship in Anesthesiology (1-6) I, II, III, IV.

The Staff (Benett, Kiss)

Work-experience 3 to 18 hours; final report.
Prerequisite: upper division standing, approval of project prior to period of internship by preceptor. Supervised work-experience in anesthesia and related fields. (F&P grading only)

Professional Courses

420. Case Management Conference (1) I, II, III, IV.

The Staff
Discussion—1 hour.
Prerequisite: interns and residents, advanced medical and veterinary students; consent of instructor. Discussion of current hospital care material presented by house officers, students and faculty. Clinical and research experience, combined with pertinent literature references, is brought to bear on the problems with emphasis on preventative as well as corrective measures.

421. Basic Science Conference (1) I, II, III, IV.

The Staff (White in charge)
Discussion—1 1/2 hours.
Prerequisite: advanced medical, veterinary, and graduate students; consent of instructor. Discussion of basic science material related directly to anesthesiology, particularly in the areas of physiology and pharmacology. Selected reading assignments are given in advance and utilized by the instructor to encourage discussion. In selected instances, the topics are organized and presented by the students and residents.
460. Anesthesia Clinical Clerkship (3-18) I, II, III, IV. (Loeb in charge)
Functional capacity evaluations (3 full days per unit). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiologic and pharmacologic principles, operative and postoperative management of patients. Considers choice and management of general and regional anesthesia techniques, resuscitation, artificial ventilation, inhalation and local anesthetic therapy and pain problems. Students electing portions of the course for credit, must receive consent of instructor. Limited enrollment.

461. Anesthesia Surgical Team Participation: Mayo VA Clinical Center (6-9) I, II, III, IV. Irwin Clinical clerkship—full time (4 to 6 weeks). Prerequisite: third- or fourth-year medical student; completion of Medical Sciences 430. Instruction in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) hazards and complications of anesthesia, (4) monitoring (including invasive), (5) record keeping, (6) surgery requirements of anesthetist. All training is under staff direction.

462. Airways and Mechanical Ventilation Management (3, 3) I, II, III, IV. (Loeb in charge)
Clinical clerkship—full time (2 weeks). Introduce medical student to endotracheal intubation, regulation of mechanical ventilators, and weaning from ventilatory support.

480. Insights in Anesthesiology (1-3) I, II, III, IV. Fung
Clinical experience—3 to 9 hours. Prerequisite: first-year medical students with good academic standing; consent of instructor. Observation of applied anatomy, physiology, and pharmacology: role of the anesthesiologists in the operating room as part of surgical team; preanesthetic and postanesthetic evaluation of patients. May be limited opportunity to be involved in procedures. (SU grading only.)

490. Resident Seminar (1) I, II, III, IV. The Staff (Giselle in charge)
Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. Series of lectures covering a spectrum of anesthesia and related topics in depth, primarily clinically oriented but also including relevant research material. Presented by faculty, residents, and visiting professor. Pertinent reference lists are circulated in advance of seminars.

490. Individual or Group Study (1-5 I, II, III, IV. Eisele and staff
Discussion—1-5 hours; laboratory—2-10 hours. Prerequisite: intern and residents with consent of instructor. Programming and discussion of laboratory investigation on selected topics.

599. Anesthesiology Research (4-18) I, II, III, IV. Gieron and staff
Laboratory—12-54 hours. Prerequisite: third- or fourth-year medical students; advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and laboratory research. (SU grading only for medical students.)

Biological Chemistry

Lower Division Course

92. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff (Bradbury in charge)
Work-experience—3-36 hours; final report. Supervised work-study experience in biological chemistry and related fields. (IP grading only.)

Upper Division Courses

192. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff (Bradbury in charge)
Work-experience—3-36 hours; final report. Supervised work-study experience in Biological Chemistry and related fields. (IP grading only.)

198. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. For undergraduates desiring to explore particular topics in depth. Lectures and conferences may be involved. (IP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Bradbury in charge)
Prerequisite: consent of instructor. (IP grading only.)

Graduate Courses

209. Biological Significance of Prostaglandins and Related Substances (2) I. Ziboh (Dermatology)
Lecture—2 hours. Prerequisite: Biochemistry 101A/103A or Physiological Sciences 101A/101B or Physiology 100A/100B or the equivalent. Qualitative estimations and biochemical study of prostaglandins, thromboxanes, prostacyclin and leukotrienes; biosynthesis from precursor fatty acids, metabolism and pathway inhibition; nutritional effects on formation; physiological and pathological functions in organ systems; present status and therapeutic promise. Offered in even-numbered years.

214. Contemporary Medical Biochemistry (1) I. The Staff
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics in biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (SU grading only.) (Same course as 414.)

216. Protein Structure (3) I. Britiski
Lecture—3 hours. Prerequisite: Biochemistry 201A or consent of instructor. Course designed to acquaint students at graduate level with currently applied techniques employed in determination of protein structure and function derived from chemical and physical techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (SU grading only.)

217. Molecular Genetics of Fungi (3) I. Holland
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; or consent of instructor. An introduction to the structure and function of fungal genomes, including gene structure, regulation and variation; control of reproduction; molecular evolution; transformation; and gene manipulation. (Same course as Plant Pathology 217.)

222. Mechanisms of Translational Control (2) I. Hensley
Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 210C or consent of instructor. Molecular mechanisms of protein translational and transcriptional control in eucaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Offered in even-numbered years.

291. Topics in Cellular Biochemistry and Physiology (2) I. Traut, Silman (Animal Physiology)
Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Zoology 121A or 121B. General physiology, cell biology and molecular biology of living systems, with emphasis on cell form and function. One topic, representing a timely and important area of current research, will serve as the focus throughout the course. May be repeated for credit. (Same course as Physiology 291C.)

298. Group Study (1-5) I, II, III, IV. The Staff (Bradbury 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 (Bradbury in charge)
Prerequisite: consent of instructor. (SU grading only.)

NOTE: For key to footnote symbols, see page 133.

Professional Courses

410A. Molecular and Cell Biology (4, 5) I. Matthews, Hopkins
Lecture—5 hours. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Application to clinically relevant systems is emphasized, particularly sickle cell anemia, thalassemias, immunoglobulins and monoclonal antibodies, oncogenes, cell proliferation controls.

410B. Cell Biology and Metabolism (3, 5) II. 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 biosynthetic processes in humans. Membrane receptors are considered as they relate to basic metabolic processes.

414. Contemporary Medical Biochemistry (1) I. The Staff
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics in biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (SU grading only.) (Same course as 214.)

418. Membrane Endocytosis and Homeostasis (4, 5) III. Walsh and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisites: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocytic system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organ interrelationships, metabolites, and minerals. Reproductive endocytosis. (Same course as Human Physiology 418.)

419. Introduction to Clinical Nutrition (3) IV. Harsted (Internal Medicine), Rucker, and staff
Lecture—30 hours total. Prerequisite: completion of first year of School of Medicine; consent by Committee on Student Evaluation and Promotion. Integrates basic concepts of human nutrition-dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in diseases—obesity, alcoholism, lipidoses, intestinal disorders, aging. (Same course as Internal Medicine 419.)

497T. Tutoring in Biological Chemistry (1-5) I, II, III, IV. The Staff
Tutoring—3-16 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. (SU grading only.)

498. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical students with consent of instructor. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical students with consent of instructor. (SU grading only.)

Clinical Psychology

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (SU grading only.)

Community Health

Upper Division Courses

101. Perspectives in Community Health (3, 3) Ill. Ongren
Lecture—2 hours; discussion—1 hour. Prerequisite: undergraduate standing. Covers comprehensively the social and political aspects of health and disease.
the responsibilities, obligations, roles and professional activities of various health-care disciplines in the community; provides students with perspectives on preventive medicine in society.

180. Health Education (1-5) I, II, III, IV. The Staff (Student Health Center)
Lecture—1-3 hours; laboratory—3-15 hours. Prerequisite: consent of instructor. Preparation for field work in the area of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (PNP grading only).

180. Aging and Health (5) II. Orgen
Lecture—4 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on care 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 (1-5) I, II, III, IV. The Staff
Externship—3-15 hours; field supervision evaluation; written progress report. Prerequisite: open to all senior and graduate students, and consent of instructor. The totality of community health practice is observed and compared to the concepts and theory seen in didactic instruction in this field-oriented course. (PNP grading only).

194. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kurugali and staff
Clinic session—3-15 hours; written report. Prerequisite: upper division student standing. The under- graduate student, through active participation in the medical aspects of community health clinics, gains knowledge of their organization, administration, and problem solving capabilities of these primary care facilities. (PNP grading only).

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Borhani in charge)
Discussion—1-5 hours; occasional visiting lecture. Prerequisite: senior standing and consent of instructor. Directed group study on selected topics relating to community health. (PNP grading only).

199. Special Studies in Community Health (1-5) I, II, III, IV. The Staff (Borhani in charge)
Prerequisite: advanced undergraduate standing and consent of instructor. Directed individual study on selected topics relating to community health. (PNP grading only).

Graduate Courses

226. Psychiatric Implications of Legal Intervention (3) I. Bauer
Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on the role of the judiciary and procedures. (SGU grading only) (Same course as Psychiatry 226).

294. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kurugali
Clinic session—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 ethnic, urban/rural or other related aspects of community clinical health. The students, through active participation in health care delivery, are able to relate conceptual with practical aspects of primary health care. (SGU 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 of community investigations in issues or problems in community health. (SU grading only for graduate students).

299. Research in Community Health (1-12) I, II, III, IV. Borhani, Weiler, Tupper, Bauer
Prerequisite: graduate, or veterinary students, or consent of instructor. Directed population and community-based research in selected topics in community health. (SU grading only for graduate students.)

Professional Courses

407. Foundations of Community Health I: Principles of Preventive Medicine, Epidemiology, and Biometry (2) II. Weiler
Lecture—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Lecture and problem-oriented discussions on chronic and infectious disease models, emphasis on principles of prevention, epidemiology and biometry.

408. Foundations of Community Health II: Preventive Medicine, Environmental Health, and Health Care Delivery (1-5) I. III. Tupper and staff
Lecture—12 hours total; discussion—8 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Nature and control of environmentally dependent mortality/morbidity in various community/occupational settings and the nature, organization, financing and delivery of health care services, and how these affect disease prevention and quality of health care.

455. Multidisciplinary Clinical Preceptorship (4 1/2) II. Orgen
Clinical experience-full time (3 weeks). Prerequisite: second-year student in good academic standing. Students will be introduced to basic principals of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatricians will be emphasized. (SU grading only).

460. Geriatrics in Community Health (6-12) I, II, III. IV. Weiler
Discussion—4 hours; clinical activity—full time (4-8 weeks); clinical setting and community needs assessment. Prerequisite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderley to severely infirm. Sites include Yolo, Sacramento, and Martinez counties.

461. Group Practice in Community Health (6-18) I, II, III, IV. Borhani
Prerequisite: third- or fourth-year medical students. Clinical preceptorships in ten-man private rural group practice. Southern Monterey County Medical Group, King City, California. Group demonstrates "one door" medical care for private and indigent farm labor families. (HEW Grant).

Discussion—4 hours; preceptorship—full time (4 weeks) covers work data analysis and public health. Prerequisite: fourth-year medical students. Provides wide variety of practical training in epidemiology, health needs of underserved, control of communicable diseases and toxic, and related.

Prerequisite: third- or fourth-year medical student. Student participation under faculty supervision in assessment of EMS needs through survey procedures, inventory of alternative resources and evaluation of EMS delivery systems. Course offered Joinly with Department of Family Practice.

480. Insights in Community Health (1-3) I, II, III, IV. Weiler
Clinical experience—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).

486. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Wheeland in charge)
To be arranged—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology selected by student and instructor. Assigned readings and/or clinical examination of selected patients.

499. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (Isseroff in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (SU grading only).

Professional Courses

420. Integrative System (2) II. Huntley and staff
Lecture—20 hours, discussion/laboratory—5 hours (25 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. The anatomical and functional relationship of the integument to the entirety of human organism. Discussed and demonstrated. Additionally, a morphologic approach based on lesion appearance in clinical dermatology.

450. Dermatology Clinical Clerkship (1-18) I, II, III, IV. Isseroff
Inpatient/outpatient service—40 hours (clinical activity).
Prerequisite: completion of three years of medical school; consent of instructor. Observation of practicing dermatologist in daily work with patients and participation in Ward Rounds and Dermatology Clinics at UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

480. Insights in Dermatology (1-3) I, II, III, IV. Wheeland
Clinical experience—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).

486. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Wheeland in charge)
To be arranged—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology selected by student and instructor. Assigned readings and/or clinical examination of selected patients.

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

Lower Division Courses

292. Health Science Hospital Practice (3-5) I, II, III, IV. Smith
Field work—in hospital setting. Prerequisite: interest in health-care delivery and consent of instructor. Field experience course for lower division students. Emphasizes observation of and providing assistance to health professionals including physicians, nurses, therapists, technicians and administrative staff. Introduces many common hospital procedures and current health issues. Students complete CPR certificate. (PNP grading only).

92C. Health Science Clinic Practicum (2) I, II, III, IV.
Field work—in clinic setting. Prerequisite: consent of instructor. Field experience to expose lower division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnostic and treatment of episodic, acute and chronic disease; laboratory testing; and appropriate referral and follow-up. (PNP grading only).

NOTE: For key to footnote symbols, see page 133.
Upper Division Courses
340A-340B-340C-340D. Clinical Preceptorship for FNP/PA Students (2-6) I-II-III-IV. Treguboff and staff
Clinical experience—10-30 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program; student spends 10-30 hours per week with an approved clinical supervisor and manages patients with common medical problems seen in primary care and long-term care facilities.

341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PA Students (2-6) I-II-III-IV. Treguboff and staff
Clinical experience—15-40 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program; student spends 15-40 hours per week in an approved clinical setting, building on clinical skills in primary care, and manages patients with complex and multiple problems.

343A-343B-343C. Inpatient Clinical Experience for FNP/PA Students (3-3-3) I, II, III, IV. The Staff
Clinical—50 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program; successful completion of course 340A-340B-340C or consent of instructor. Students in the inpatient setting in Family Practice, Surgery, and medical specialties. Intensive experiences in LCOMC and/or affiliated institutions. Designed to expose the FNP/PA program student to inpatient management: acquiring patient/FNP/PA role in inpatient settings.

354. Clinical Geriatrics (3) III. Higby
Clinical—9 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program; application of principles of geriatric care to elderly patients in nursing homes, hospices, and other clinical settings.

350. Ethics and Trends in Health Care for FNP/PA Students (2) II. Treguboff
Lecture-discussion—2 hours. Prerequisite: registration 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 processes will be related to the role of the Family Nurse Practitioner/Physician Assistant.

352A-352B-352C. Professional Development of the Physician Assistant (1-1-1) III-III-III. Treguboff and staff
Lecture-discussion—1 hour. Prerequisite: registration in Physician Assistant Program. Study of role of the physician assistant and its historical evolution of the organizational responsibilities and legal considerations of the physician assistant.

354A-354B-354C. Fundamentals of Primary Care for FNP/PA Students (6-4-4) I, II, III Treguboff and staff
Lecture-discussion—4.6 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care.

355A-355B-355C. Advanced Principles of Health Care for FNP/PA Students (4-4-4) I-II-III. Treguboff and staff
Lecture-discussion—4 hours. Prerequisite: registration in the Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems, and to learn the management of patients in inpatient settings.

356. Pharmacology for FNP/PA Students (4) I-II-III. Treguboff and staff
Lecture-discussion—4 hours. Prerequisite: registration 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 patient care and geriatric patients, and to pregnant or lactating women.

360A-360B-360C. Ethics and Trends in Health Care for FNP/PA Students (1-1-1) I-II-III. Treguboff and staff
Lecture-discussion—1 hour. Prerequisite: registration in the Family Nurse Practitioner Program or consent of instructor. To learn about trends and ethics in health care, and review processes 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-362C. Professional Development of the FNP (1-1-1) I-II-III. Treguboff and staff
Lecture-discussion—1 hour. Prerequisite: registration in the Family Nurse Practitioner Program or consent of instructor. To study the role of the nurse practitioner and its historical evolution, of the legal considerations, of the implications of case management and advocacy for the consumer, and of professional responsibilities of the Family Nurse Practitioner.

364A-364B-364C. Behavioral Science for FNP/PA Students (2-3-3) I-II-III. Treguboff and staff
Lecture-discussion—1.5 hours. Prerequisite: registration 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 skills to help them gain insight and reach their own solutions, of behavior modification concepts and techniques.

NOTE: For key to footnote symbols, see page 133.
192. Internship in Morphology (1-12 I, II, III, IV, The Staff)
Work-learning experience—336 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of work learn. Experience of supervised work study in research laboratories of members of the Department. (P(NP grading only.)

197T. Tutoring in Human Anatomy (3-3) II. The Staff
Discussion—1 hour, laboratory—6 hours. Prerequisite: completion of course 101 with a grade of B or better. Required laboratory instruction in gross and microscopic human anatomy with small groups of undergraduates under the supervision of the instructor. (SU grading only.)

198. Directed Group Study (1-5), I, II, III, IV. The Staff (Chairperson in charge)
Discussion—1-10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P(NP grading only.)

199. Special Study for Advanced Undergraduates (1-5), I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P(NP grading only.)

Graduate Courses

200. Gross Anatomy (8) I. Patterson
Lecture—3 hours; discussion—1 hour; laboratory—10 1/2 hours. Prerequisite: student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through dissection and lecture. Lecture and dissection introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

201. Human Embryology (2) II. Hendrickx
Lecture—2 hours. Prerequisite: graduate student status and consent of instructor. Developmental anatomy of the human from fertilization to parturition including the origin of basic form of the embryo, development of the organ systems, and nature of anomalous development.

202. Human Microscopic Anatomy (5) II. Meizel
Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of sectioned material at the light microscopic and ultrastructural levels.

203. Neurosciences (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; neuroendocrine, and cognitive functions.

205. Cell Biology of Mammalian Gametes and Fertilization (2) II. Meizel
Seminar—2 hours. Prerequisite: lecture courses in biochemistry and cell biology, consent of instructor. Presentation and discussion by students of selected research areas concerned with the cell biology of mammalian fertilization. Emphasis on mechanisms involved in gamete maturation, ovulation, sperm capacitation, acrosome reaction, gamete binding, gamete fusion, block to polyspermy, and pronuclear formation. Offered in odd-numbered years.

290. Seminar (1), I. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

290C. Research Group Conference (1), I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate student with research experience (may be taken concurrently); consent of instructor. Discussion of problems, progress and literature relevant to current research undertaken by laboratory groups in Human Anatomy. (SU grading only.)

292. Fertilization and Gamete Literature Critique (1), I, II, III, Meizel
Seminar—1 hour. Prerequisite: a course in cell biology and in biochemistry or consent of instructor. Criti-
cal evaluation of current journal articles dealing with cell biology and biochemistry of gametes and fertil-
ization. Selected papers will be presented and dis-
cussed in detail by students and faculty. May be repeated for credit. (SU grading only.)

298. Advanced Group Study (1-5), I, II, III, IV. The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

400. Developmental, Gross, and Radiologic Anatomy (10) I. Patterson
Lecture—6 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dissections. Embryology is covered from implan-
tation to birth.

402. Human Microscopic Anatomy (5) II. Meizel and staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: Approval by committee on Student Evaluation and Promotion. Examinations the normal microscopic struc-
ture of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-
function relationships. Accompanying laboratories involve analysis and identification of section material at the light microscopic and ultrastructural levels.

403. Neurobiology (5) III. Vijayan
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

497T. Tutoring in Human Anatomy (1-5) I, II, III, IV. The Staff
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutor-
ing 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) I, II, III, IV. The Staff
Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Human Physiology

Upper Division Courses

192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Rinken in charge)
Work-learning experience—336 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in physiology and related fields. (P(NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Rinken in charge)
To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P(NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Rinken in charge)
Laboratory—9-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P(NP grading only.)
Graduate Courses

200. Human Physiology (B) II. Curry, Renkin, and staff
Lecture—50 hours total; discussion—10 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. Lecture—20 hours; course 400; research-discussion and laboratory—demonstration sessions, and examinations separate.

210. Advanced General Physiology (B) III. Curry, Cale
Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in even-numbered years.

211. Renal Physiology (I) I. Robinowitz
Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biologic transport, fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in man. Offered in odd-numbered years.

250. Circulatory Transport and Fluid Exchange (3) I. Reinke, Kramers
Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112-113/114 or courses 400-403/418 or the equivalent; or consent of instructor. Lectures, assignments related to the discussion of: principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in even-numbered years.

250. Physiological Systems Analysis (5) I. Smith
Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 22B and Physiology 113; or consent of instructor. Quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; application of these techniques to investigation of homeostasis. Offered in odd-numbered years.

251. Simulation of Physiological Systems (1-3) I, II, III, IV. Smith
Laboratory—3-9 hours. Prerequisite: course 260 or the equivalent; consent of instructor. Selected problems in simulation of physiological control systems. Simulations performed on current microcomputer hardware, including high level simulation languages. Problems may be selected from literature or from student's research; experimental testing of the simulation encouraged.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory and physiological evaluations of pulmonary function. (Same course as 480.)

285. Peripheral Circulation (3) I. Gray
Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111B, 113, or the equivalent and consent of instructor. Series of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics on: anatomy, physiology, and pharmacology of vascular smooth muscle, regional circuits, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in even-numbered years.

294. Group Study (1-5) I, II, III, IV. The Staff (Renkin 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 (Renkin in charge)
Prerequisite: consent of instructor. (SJU grading only)

Professional Courses

400. Human Physiology (B) II. Curry, Renkin, 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. Vlayen
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 structural and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Monon Anatomy 403.)

418. Mammalian Endocrinology and Homeostasis (4.5) III. Welt, and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiologic and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

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 290.)

477T. Tutoring in Human Physiology (1-5) I, II, III, IV. Renke
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. (SJU grading only)

486. Directed Reading and Group Study (1-4) I, II, III, IV. Renke and staff
Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (SJU grading only)

499. Research (1-6) I, II, III, IV. Renke and staff
Prerequisite: medical students with consent of instructor. Limited to investigation on selected topics. (SJU grading only)

Internal Medicine

Upper Division Courses

192. Internship in Internal Medicine (1-12) I, II, III, IV. The Staff
Work-load experience—3-36 hours; final report. Prerequisite: upper division standing. Supervised work-study experience in internal medicine and related fields. (PNP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: upper division standing; consent of instructor. (PNP grading only)

Graduate Course

290. Topics in Molecular Medicine (1) I, II, III, IV. Lawrence
Discussion—1 hour. Prerequisite: graduate student standing and consent of instructor. Reading and discussion of major advances in the molecular biology aspects of medicine. Students and staff will choose and present molecular biology papers from basic research journals. Emphasis will be on new applications of recombinant DNA technology to medicine and applied basic research. (SJU grading only)

Professional Courses

400. Introduction to Emergency Medicine (1.5) I. Deret and staff
Clinical activity—20 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion.

Basic CPR with American Heart Association certification; first aid including splinting, bandaging, control of bleeding and transportation; evaluation of the whole patient and prioritization of evaluation and treatment; mechanisms of injury; exposure to pathophysiology of specific body systems.

401A. Physical Diagnosis Practicum (2) I. G. E. Fouke, J. Robbins
Lecture—1 hour; discussion—1 hour, and clinical activity 4 hours (30 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Students spend 6 days at one of the University or affiliated hospitals or in office of a medical facility person, learning and practicing clinical skills. Additional time will be in a preceptorship, course 401B. (Deferred grading only, pending completion of course sequence.)

401B. Physical Diagnosis Practicum (1) I. G. E. Fouke, J. Robbins
Individual study—1 hour; clinical practice—six 3-hour sessions. Prerequisite: consent by Committee on Student Evaluation and Promotion. School of Medicine faculty members will supervise, as preceptors, one or two students each session. They will meet at least six times with a suitable patient for students to develop individual clinical skills. (Deferred grading only, pending completion of course sequence.)

402. Occupational Medicine (1) I. H. Schniker
Lecture—1 hour; discussion—1 hour. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of occupational medicine. Diagnosing disease due to occupational exposure, occupational diseases of the lungs, skin, nervous and reproductive systems, cancer of occupational origin. Occupational epidemiology and pathophysiologic aspects of occupational medicine discussed.

419. Introduction to Clinical Nutrition (3) IV. Hlaisted, Pinney, Marshall, and staff
Lecture—30 hours total. Prerequisite: completion of first year of School of Medicine; consent by Committee on Student Evaluation and Promotion. Integrates basic concepts of human nutrition-dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in diseases—obesity, alcoholism, lipemias, intestinal disorders, aging. (Same course as 418.)

240A. Hematopoietic and Lymphohematotic System (4.5) I. Lewis, DeNardo and Staff
Lecture—21 hours; laboratory—23 hours; discussion—30 hours (64 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a solid foundation in basic and diagnostic hematology with less emphasis on details of blood disease management. Introduction to radiation as it affects patients and society and the use of radiocnucleides in medicine.

240B. Pathophysiology of Digestive Diseases: Gastrointestinal System (3.5) I. Pimstone and staff
Lecture—51 hours; discussion—9 hours (40 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic emphasis on pathophysiological basis of gastrointestinal and hepatic disorders. Case discussions and symposia held primarily to exemplify basic principles covered by lectures.

240C. Respiratory System: Pathophysiology of Respiratory System (4) I. Lillington and staff
Lecture—38 hours; discussion—14 hours (52 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Foundation of integrative pathophysiology of the human respiratory system.

240D. Principles of Cardiovascular Medicine (4) I. Laslett and staff
Lecture—3 hours; discussion—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of diagnosis and management of cardiovascular disorders.

240E. Urinary System (3.5) III. Gulyassy and staff
Lecture—24 hours; discussion—18 hours; laboratory—10 hours (52 hours total). Prerequisite: consent:
by Committee on Student Evaluation and Promotion. Determined to be inability to meet academic standards; (b) major categories and mechanisms of parenchymal renal diseases; (c) major congenital and acquired urologic diseases; (d) urinary tract infections. (Same course as J240.)

420F. Endocrine Metabolic-Regulatory (4.5) III. Soeldner and staff
Lecture—38 hours; discussion—14 hours (52 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis, and management of patients with endocrinological disorders can be rationalized.

440. Ambulatory Medicine Clerkship (6 or 12) I, II, III, IV. Fitzgerald
Clinical experience—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Four- or eight-week ambulatory medicine experience in an internal medicine setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in the outpatient setting.

461. Problems in Internal Medicine (6 or 9) I, II, III, IV. White
Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school; consent of instructor. Study of inpatients hospitalized on the Medicine Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, mornings with instructor, Monday through Friday, afternoons patient assignments. Teaching conferences and combined radiology pathophysiology medicine seminars. Weekly allied specialty conference.

462. Externship in Medicine (1-21) I, II, III, IV. Fitzgerald and staff
Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician on medical ward under direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth night. Also taken at Children's S.F. Hospital. Limited enrollment.

463. Acting Internship in Medicine Intensive Care Unit (MICU) (9) I, II, III, IV. Albertson
Clinical activity—full time. Prerequisite: completion of third year in medical school; consent of Director of MICU. At UCD Medical Center, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every third night. Limited enrollment.

*465. Internal Medicine and Subspecialties in Outpatient Clinic: VA Outpatient Clinic (6-18) I, II, III, IV. Greco and staff
Clinical activity—full time (4 or 12 weeks); includes conference 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 student interested in independent laboratory research, ambulatory or inpatient care responsibility on campus, at UCD Medical Center or off campus by specific arrangement. (SU grading only)

Internal Medicine—Cardiology

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-study experience in cardiology. May be repeated for credit up to 12 units. (PINP grading only.)

Graduate Course

229. Basic Science in Cardiology (1) I. Kaufman
Lecture—1 hour. Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in even-numbered years. (SU grading only.)

Professional Courses

401. Clinical Cardiology Clerkship: Kaiser (3-18) I, II, III, IV. The Staff
Clinical clerkship (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 role of echocardiography, nuclear cardiology, electrocardiography, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrollment.

460. Cardiology Clinical Clerkship: Consult Service (3-18) I, II, III, IV. The Staff
Outpatient-clerkship service—full time (40 hours). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Participation with members of subspecialty consult service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiological disorders. May be repeated for credit. Limited enrollment.

461. Management of Coronary Artery Disease: Coronary Care Unit (3-18) I, II, III, IV. The Staff
Inpatient-clerkship service—full time (40 hours). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Research in interdepartmental coronary care unit under direction of a qualified instructor. Criteria for participation determined by instructor. Current status of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring and 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.

462. Cardiology Clinical Clerkship: Martinez VA Hospital (3-18) I, II, III, IV
Lecture—1-2 hours; discussion—8 hours; seminar—2 hours; clinical consultation—20-25 hours. Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology, Martinez VA Hospital, and consent of instructor. Clinical evaluation in cardiology under supervision of medical resident and attending physician. Active participation in seminars and conference. Limited enrollment.

464. Preventive Cardiology (6) I, II, III, IV. Amsterdam
Seminar—2 hours (4 weeks); clinic—full-time (4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminar and reading on use and efficacy of prevention of cardiovascular disease. Will be carried out in lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services.

480. Insights in Cardiology (1-3) I, II, III, IV. The Staff
Clinical experience—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)

489. 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 S.U. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (SU grading only.) Limited enrollment.

493. Research (1-12) I, II, III, IV. The Staff
Prerequisite: approval by Division of Cardiology. (SU grading only)

Internal Medicine—Emergency Medicine

Upper Division Course

192. Internship in Emergency Medicine (1-12) I, II, III, IV. Deret and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in emergency medicine. May be repeated for credit up to 12 units. (PINP grading only.)

Professional Courses

460. Emergency Medicine Clerkship (3-6) I, II, III, IV. Deret and staff
Clinical experience—full time (2 to 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. Acting Internship in Emergency Medicine (6-12) I, II, III, IV Deret
Clinical clerkship—full time (4 to 8 weeks). Prerequisite: satisfactory completion of course 460. Acting internship provides clinical experience in emergency medicine. Students are assigned to the regular Emergency Department intern schedule and under the supervision of the faculty. See and evaluate Emergency Room (ER) patients with responsibility similar to an intern.

466. Research (5-18) I, II, III, IV. Deret
Laboratory—40 hours; research—full time (4 to 12 weeks). Prerequisite: consent of instructor. Elective where topics may be selected in either basic or clinical research areas of the Emergency Department. (SU grading only)

Internal Medicine—Endocrinology

Upper Division Course

192. Internship in Endocrinology (1-12) I, II, III, IV. Walter and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in endocrinology. May be repeated for credit up to 12 units. (PINP grading only.)

Graduate Course

229. 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
Inpatient-clerkship activities—full time (3 days per week). Prerequisite: Medical Sciences 431 and/or
consent of instructor. Participation with members of subspecialty services in the initial evaluation, work-up, management, and follow-up of patients with endocrine disorders. Both inpatient and outpatient experience. Limited enrollment.

465. Endocrinology Clinical Clerkship (9 or 18) I, II, III, IV. North Lecture-discussion-seminar; clinical consultation—20-25 hours. Prerequisite: fourth-year medical student with consent of instructor. Clinical consultations in endocrinology at Martinez VA Hospital under supervision of medical resident and attending physician. Participation in seminars and conferences. 460. Insights in Endocrinology (1-3) I, II, III, IV. Walter Clinical experience—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (SU grading only.)

496. Research (1-12) I, II, III, IV. The Staff (Walter in charge) Prerequisite: consent of instructor.

Internal Medicine—Gastroenterology

Upper Division Course 192. Internship in Gastroenterology (1-12) I, II, III, IV. Starr staff. Internship—3-38 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses


471A-471B-471C-471D-471E-471F-471G. Clinic of AIDS and Related Disorders (2) I, II, III, IV. Flynn Discussion—1 hour; clinical experience—3 hours. Prerequisite: third and fourth year medical students in good academic standing and permission of instructor. Students will participate in patient care, including patient examination and the diagnosis and treatment of patients with acquired immune deficiency syndrome and AIDS related complex. Students will participate in intensive ambulatory care medicine as well as clinic research. (SU grading only.)

496. 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 project within the area 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

Upper Division Course 199. Research in Hematology-Oncology (1-5) I, II, III, IV. MacKenzie and staff. Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

Graduate Courses

296. Topics in Hematology (1-4) I, II, IV. The Staff (Lewis in charge) Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts in the pathophysiology of the hematopoietic system, the pathophysiology of hematopoietic disease. Concepts of therapeutics will be discussed for the specific topic. Research experience will be directed by the resident in charge.

299. Research (1-12) I, II, III, IV. The Staff (Lewis in charge) Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

NOTE: For key to footnote symbols, see page 133.

Professional Courses

460. Hematology-Oncology Clinical Clerkship (6-1) I, II, III, IV. J.P. Lewis and staff. Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. 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.

461. Ambulatory and Consult Clerkship (6-12) I, II, III, IV. Lewis and staff. Clinical experience—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematology/oncology clinics, hemophilia clinic, sickle cell clinic, and two medical/surgical joint clinics. This rotation will work on inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division.

462. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. Gandra and staff. Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Intensive clinical experience in hematology-oncology at Martinez VA Hospital, with emphasis on evaluating new patients, reading bone marrows, and in administering chemotherapy. Weekly case sessions with faculty and presentation of a comprehensive review of one topic. May be repeated for credit. Limited enrollment.

490. Practicum in Care for the Terminally IlI (6) I, II, III, IV. Meiers Discussion—3 hours; seminar—2 hours; hospice clinical activity—full time (4 weeks duration); written report. Prerequisite: fourth-year medical student and an interview with program Medical Director. UCSD Medical Center Sacramento Continuing Care Program provides support services to patients with terminal illness. Emphasis on outpatient care and home care. This elective provides experience in symptom relief, psycho-social counseling and bereavement counseling. Written report will be major component used in grading. (SU grading only.)

496. Research (1-12) I, II, III, IV. The Staff (Lewis in charge) Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Infectious Diseases

Upper Division Courses

192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Goldstein and staff. Work-learn experience—3-38 hours; final report. Supervised work-learn 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 (Goldstein in charge) Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic histology and bacteriology 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 Course

250. Small Computers in Medical Research (3) I. Donovan Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Theoretical principles and practical aspects of mini- and microcomputer applications in medical research.
Professional Courses
400. Infectious Diseases Clinic (4-5-6) I, II, III, IV. Goldstein and staff
Clinical—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. (SU grading only.)
400. Infectious Diseases Clinical Clerkship (6-18) I, II, III, IV. Goldstein
Clinical experience—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 participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.
465. Clinical Clerkship (3-18) I, II, III, IV. McCabe Lecture—1 hour, discussion—10 hours, laboratory—variable; clinical clerkship—full time (2 to 12 weeks). Prerequisite: core medicine clerkship. Students will do clinical consultations in infectious Diseases under the supervision of a fellow in infectious diseases and attending physician. Students will participate actively in conferences and attending rounds with optional participation in the diagnostic laboratory.
480. Insights in Infectious Diseases (1-3) I, II, III, IV. Goldstein
Clinical experience—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Students will attend infectious diseases 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. Goldstein 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 (Goldstein in charge)
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students,1 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—Nutrition
192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted, McCamish, Phinney, and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course
290C. Clinical Nutrition Research Conference (1) I, II, III, Halsted, Phinney, McCamish, Davis Seminar—1 hour. Weekly. Conference presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (SU grading only.)

Professional Courses
461. Nutrition Clinical Clerkship (3-18) I, II, III, IV. Halsted, McCamish, Phinney, and staff
Lecture—2 hours; clinical experience—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems under-nutrition due to various illnesses.
480. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted, McCamish, Phinney, and staff
Clinical experience—3-9 hours. Prerequisite: student in good standing; consent of instructor. Students 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, McCamish, Phinney, Davis
Prerequisite: student in good standing; consent of instructor. Participation in on-going clinical or basic nutrition research. Student may devise own project depending upon time commitments.

Internal Medicine—Occupational and Environmental Health
192. Internship in Occupational and Environmental Health (1-12) I, II, III, IV. Beaumont; II, Samuels; III, McCurdy; IV, Gold
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.)
192. Internship in Occupational and Environmental Health (3-36) 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-study 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 (Chpremier in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
250. Pesticide Epidemiology (3) I, III, Goldsmith
Discussion—1 hour; seminar—2 hours. Prerequisite: medically inclined students; graduate students in biological or environmental health sciences who have completed or are enrolled in Epidemiology and Preventive Medicine 405; upper division undergraduate who has completed Environmental Studies 125, consent of instructor. Examination of the human health effects and the risk of disease from occupational and community exposure to pesticides. Some of the clinical equivalents include cancer: nevusus, toxic effects, reproductive impairment, and dermatologic conditions.
251. Environmental Epidemiology (3) II. Gold
Discussion—1 hour; seminar—2 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 community (and occupational) exposure to toxic waste.

Professional Courses
466. Occupational and Environmental Medicine Elective (6-12) I, II, III, IV. Schenker
Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: fourth-year student and consent of instructor. Participation in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participates 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 experience—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 activities 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; clinic—4 or 8 hours. Prerequisite: third- or fourth-year medical student or consent of instructor. Student participates in activities of 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 UCD Medical Center.

Internal Medicine—Pulmonary Medicine
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-study 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
466. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Albertson and staff
Clinical experience—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.
482. Pulmonary Clinical Clerkship (3-18) I, II, III, IV.
Krumpe and staff
Clinical activity—full time. Prerequisite: completion of second year of medical school and consent of instructor. Participation at the Martinez VA Hospital with the Pulmonary Service for one year of service in the Pulmonary Medicine Unit. (SU grading only.)

484. Outpatient Program in Pulmonary Medicine (3-6) I, II, III, IV. Albertson and staff
Clinical activity—two 3-hour morning sessions. Prerequisite: completion of first year of medical school and consent of instructor. Attendance one morning at TB Clinic and one morning at Pulmonary Medicine Clinic at UCSF Medical Center. Students will be responsible for initial work-up of patients and their presentation to attending staff.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
Clinical experience—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Students will attend respiratory critical care clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnostic and therapeutic management of common pulmonary problems. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Coos in charge)
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Rheumatology-Allergy
Lower Division Course
99. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory—1-4 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-study 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. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, autoimmunity and immunity. Offered in even-numbered years.

298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin
Laboratory—1-5 hours. Prerequisite: consent of instructor. Laboratory and/or laboratory work as required. (SU grading only.)

299. 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 athymic (nude), asplenic, and New Zealand mice) and in the cellular immune system of patients with systemic lupus erythematosus, Sjögren's syndrome, polymyositis and drug hypersensitivity. (SU grading only.)

Professional Courses
480. Rheumatology Clinical Clerkship (1-18) I, II, III, IV. Leek and staff
Inpatient-outpatient clinical activity—full time. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in the diagnostic and therapeutic management of patients with rheumatologic diseases.

481. Allergy Clinical Clerkship (3-18) I, II, III, IV. Gershwin and staff
Inpatient-outpatient clinical activity—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with practiced allergist in day work with patients and in the 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 (Coos in charge)
Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and scientific investigation. (SU grading only.)

Medical Microbiology
Upper Division Courses
107. Chemical and Cellular Immunology (4) I. Benjamini, Slobetsn
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 immunochemistry; immunological and cellular aspects of hyper-sensitivity; immunogenetics and regulation of the immune response. (Same course as 407.)

115. Ecological Parasitology (2) I. Zith
Lecture—2 hours. Course will be devoted to the study of mankind's influence on environmental factors that affect the development and spread of parasitic agents.

116. Parasitology for Wildlife Biologists (2) I. III, IV.
Theis
Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role of parasites and pathogen in plant and animal life. Offered in even-numbered years. (Same course as 430.)

130. Medical Mycology (2) I. Pappagianis
Lecture—2 hours. Prerequisite: a course in pathogenic microbiology, consent of instructor. Various aspects of fungal infection, particularly affecting the immune system, will be discussed. (Same course as 402.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beeman in charge)
Work-learning experience—3-36 hours. Prerequisite: upper division standing. Approval of proctor prior to internship. Supervised work-study 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 (Beeman in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and laboratory investigation on selected topics. (P/NP grading only.)

199. Research in Medical Microbiology (1-15) I, II, III, IV. The Staff (Beeman in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses
298. Frontiers in Immunology (2) I, II, III, Benjamin, Sobrezin
Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and the interrelationships. (SU grading only.)

215. Medical Parasitology (5) I. Theis
Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in even-numbered years. (Same course as 415.)

220. Current Concepts in Bacterial Ultrastructure (2) I, II, Beaman
Discussion—2 hours. Prerequisite: 200. Paper. Prerequisite: Research 105 or consent of instructor. Critical evaluation of current literature dealing with all aspects of bacterial ultrastructure. Discussion of selection of appropriate techniques and formal student presentation of assigned topics.

265. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. (Sections 1, 2, 4, 5, SU grading only.)

298. Research (1-12) I, II, III, IV. The Staff (Beaman in charge)
Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

Professional Courses
403. Immunologic Prophylaxis (2) I. Pappagianis
Lecture—2 hours. Prerequisite: consent of instructor. Bases of immunization practices and immunoserologic diagnostic procedures particularly related to diseases of man. (SU grading only.)

407. Chemical and Cellular Immunology (4) I. Benjamini, Slobetsn
Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunology; immunological and cellular aspects of immunocompetence; immunogenetics and regulation of the immune response. (SU grading only.)

408. Immunology and Immunopathology (2) I, II, III, IV. Beaman
Lecture—2 hours. Prerequisite: consent of instructor. Immune system and its role in the development of diseases associated with immunocompetence; immunogenetics and regulation of the immune response. (Same course as 410.)

411. Tissue Typing (1-4) I, II, III, IV. Chang
Individualized instruction, discussion—1-3 hours and laboratory—3-9 hours. Prerequisite: course in immunology; consent of instructor. Principle and technique of tissue typing through assigned reading and laboratory instruction. Contents will vary according to the needs of the students. (SU grading only.)

415. Medical Parasitology (5) I. Theis
Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in even-numbered years. (SU grading only.)

420. Current Concepts in Bacterial Ultrastructure (2) I, II, Beaman
Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of
instructor. Evaluation of current status of bacterial ulcerstructure with an emphasis on host-parasite interactions through discussions and assigned readings. (SU grading only.)

430. Medical Mycology (2) II. Pappagianis Lecture—4 hours. Prerequisite: a course in pathogenic mycology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis, and pathology, diagnosis and therapy. Offered in even-numbered years. (Same course as 130.)

480A. Medical Immunology (2.5) III. Scibierski, Benjamin Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Presents the structure and function of the molecules, cells, and tissues involved in immunity, and their interactions in health and disease.

480B. Pathogenic Microbiology (7) I. Beamann and staff Lecture—64 hours total; laboratory—28 hours total. Prerequisite: second-year medical students with consent by Committee on Student Evaluation and Promotion. Biology of pathogenic microorganisms with emphasis on their role in human disease.

497T. Tutoring in Medical Microbiology (1-5) I, II, IV. Beamann and staff Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beamann in charge) Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beamann in charge) Prerequisite: medical students with consent of instructor. (SU grading only.)

Neurology

Lower Division Course

190. 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 electromyography and instrumentation are offered in Davis. (P/NP grading only.)

Graduate Courses

201. Human Behavioral Neurology (2) II. Jagust, Robertson Lecture-discussion—2 hours. Prerequisite: Human Anatomy 203; Psychology 108 or 136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and cognitive parameters. Evaluation of these parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuromaging tests.

290. Seminar in Selected Topics (1) I, II, III, IV. Scobey, Gorin Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (SU grading only.)

298. Group Study (1-5) I, II, III, IV. The Staff (Gabor in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (SU grading only.)

299. Individual Special Study and Research (1-12) I, II, III, IV. Scobey Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (SU grading only.)

Professional Courses

420. Neurornuscular Pathophysiology (4) III. Gabor and staff Lecture—34 hours and discussion—16 hours (50 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system function, and trauma.


454. Electrocerephalography and Evoked Potentials (10) I, II, III, IV. Gabor, Selay Clinical activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electroencephalographic diagnosis including technical basis of electroencephalography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

455. Child Neurology (6) I, II, III, IV. Gospe Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to group of full-time faculty who will discuss clinical findings, diagnostic, management, and therapy. This course satisfies the fourth year neuroscience requirement.

456. Cortical Neurology (18) I, II, III, IV. F. M. F. Priller, Knight Clinical neurological research—full time (12 weeks at Martinez VA Hospital). Prerequisite: course 451 or equivalent; medical student who will pursue small project in clinical neurological research on higher cortical functions. Focus on scientific analysis of behavior in disease states.

457. Special Topics in Neurology (18) I, II, III, IV. The Staff Clinical activity—full time (12 weeks).

NOTE: For key to footnote symbols, see page 133.
ed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room.

460. Clinical Neurosurgery (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (3 days per unit; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Observation of neurosurgical patients in the neurosurgical intensive care unit. Students participate in meaningful aspects of neurosurgical procedures and attend all scheduled conferences, rounds, and seminars.

464. Externship (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision.

465. Clinical Neurosurgery Martinez VA Medical Center (6-18) I, II, III, IV. Andrews and staff
Clinical activity—full time (4 to 12 weeks). Prerequisite: fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Patient work-up, perioperative care, and frequent first or second assisting in the operating room. Close integration with active Neurosurgical Service. In-depth exposure to the neurosurgical history examination and diagnostic procedures for patients with nervous system disorders.

470. Advanced Clinical Neurosurgery (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Clinical activity—full time (4-12 weeks). Prerequisite: four-year medical student in good academic standing. Students will function as acting intern on neurosurgical service. Admission and management of patients; review of history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences.

480. Insights in Neurosurgery (1-3) I, II, III, IV. The Staff
Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of neurosurgical care in emergency room, operating room and hospital floors. Includes manner of treatment of a variety of chronic and acute neurological disorders. (SU grading only)

499. Neurosurgery Research (6-18) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: medical student with consent of instructor. Research participation in ongoing neurosurgical projects or may pursue and design independent projects. (SU grading only)

Obstetrics and Gynecology

Lower Division Courses

190. Seminar in Early Mammalian Development (1) I, II, III. Weyer Seminar—1 hour; short paper. Prerequisite: Zoology 100 or equivalent. Each student will present paper from the recent scientific literature on various research topics in early mammalian development. Short paper 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 (1-3) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

200. 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)

231. Seminar in Early Mammalian Development (1) I, II, III, IV. Weyer Seminar—1 hour. Each student will be asked to present a paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

298. Group Study (1-5) I, II, III, IV. Overstreet Prerequisite: graduate standing; consent of instructor.

299. Research (1-12) I, II, III, IV. Overstreet Prerequisite: graduate standing; consent of instructor. (SU grading only)

Professional Courses

*401. Discussions in Obstetrics and Gynecology (2) I, II, III, IV. Hanson and staff
Discussion—2 hours per week. Prerequisite: second-year medical students; consent of instructor. Obstetrics and gynecology history and examination, an overview of the physiology and pathology of the female reproductive tract, and a consideration of the reaction of the female to pelvic disease and to her sexual identity.

*420. Reproductive System and Perinatology (2) I, II.
The Staff (Obstetrics and Gynecology, Pediatrics)
Lecture—3 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented. Abnormalities in perinatology are approached in study of appropriate clinical problems. (Same course as Pediatrics 420."

*460. Elective Clerkship (4-18) I, II, III, IV. Schneider and staff
Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in Inpatient and outpatient care at San Joaquin General Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

*462. Elective Clerkship (4-18) I, II, III, IV. Schneider
Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A; consent of instructor. Student will participate actively in outpatient care at Planned Parenthood Association. Sacramento. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

464. Obstetrics and Gynecology Clerkship (4-18) I, II, III, IV. The Staff
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at Woodland Memorial Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

465. Elective Clerkship (4-18) I, II, III, IV. The Staff
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A (or the equivalent); consent of instructor. Active participation in inpatient and outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

466. Obstetrics: Adolescent Pregnancy (4-18) I, II, III, IV. Meyers Seminar; clinical activity—individually arranged. Prerequisite: two years of medical school; consent of instructor. Direct clinical contact with at least two adolescent patients per week for the period. Emphasis on obstetrical and psychological clinical issues of pregnancy, delivery, the puerperium and neonatal interaction. Relevant literature will be reviewed.

469. Perinatal Medicine Clerkship (4-18) I, II, III, IV. Hanson and staff of (Maternal/Pediatric Medicine Division)
Prerequisite: fourth-year medical students; consent of instructor. Consultation for such problems as toxemia, diabetes, hypertension, cardiac disease, premature labor, etc., and all types of inpatient problems, as well as exposure to ultrasound, amniocentesis and genetic counselling.

470. Acting Internship in Obstetrics and Gynecology (6-18) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; 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. Hourly with attending.

471. Ambulatory Gynecology and Obstetrics (6-8) I, II, III, IV. MacKay
Clinical activity—full time (4-6 weeks). Prerequisite: 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-Operation Clinic, other specialty clinics as assigned. Student will conduct examinations, present patients to staff and will be able to discuss treatment regimens. Night call in Labor and Delivery every three to four days.

499. Research in Obstetrics and Gynecology (1-18) I, II, III, IV. Cheng and staff
Prerequisite: medical student with consent of instructor. Each student will pursue a research problem of his/her own choosing, with help selected from faculty. Integration with ongoing faculty research projects recommended. (SU grading only)

Ophthalmology

Upper Division Course

192. Research Internship (1-12) I, II, III, IV. The Staff
Work-learn experience—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P/NP grading only)

Graduate Course

299. Basic Research in Visual Science (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only)

Professional Courses

400. Ophthalmology Required Clerkship (3) I, II, III, IV. Manns
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 diseases manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

401. Basic Clinical Ophthalmology (4.5) I, II, III, N. Roth
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); completing of treatment for eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

404. Advanced Subspecialty Ophthalmology (6 or 9) I, II, III, IV. Manns and Geertman
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 pediatric surgery. Rotations at UCSD 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. Marren and staff Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in clinical ophthalmology including slit-lamp program, patient exposure, and department conferences (i.e., grand rounds and subspecialty conference). (SU grading only.)

481. Group Study (1-3) I, II, III, IV. The Staff (Roth in charge) Prerequisite: medical students with consent of instructor. Directed reading and discussion. (SU grading only.)

485. Research in Ophthalmology (1-12) I, II, III, IV. The Staff To be arranged—3-36 hours. Prerequisite: medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external diseases. (SU grading only.)

Orthopaedic Surgery

Lower Division Course
480. Special Studies for Undergraduates (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: lower division standing. (P/NP grading only.)

Upper Division Course
489. Special Studies for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, Marcer Lecture—2 hours; laboratory—1 hour. Prerequisite: completion of first year of medical school. Multidisciplinary course introducing student to the pathophysiology of sport injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (SU grading only.) (Same course as Physical Medicine and Rehabilitation 401A.)

421. Skeletal System (2.5) Lecture—20 hours total; discussion—12 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a basic science understanding of normal and abnormal skeletal and joint development, physiology, and pathology. Clinical correlates are provided only as a supplement to emphasize cause and effect phenomena as it relates to bone and joint disease.

426. Initial Management of Musculoskeletal Trauma (3-6) I, II, III, IV. Rodrigo Clinic—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; completion of human anatomy and consent of instructor. Elective providing opportunity to observe and assist in emergency and operating rooms in management of orthopaedic problems of trauma under supervision of resident on call. Does not meet surgical specialty requirement. Limited enrolment.

428. Ambulatory Orthopaedics (2-6) I, II, III, IV. Rodrigo Clinic—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 exam and interpretation of x-rays. Does not meet surgical specialty requirement. Limited enrolment.

440. Clinical and Surgical Orthopaedics (6) I, II, III, IV. Rodrigo Clinical experience—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and consent of instructor. Rotation on an assigned orthopaedic service, emphasizing didactic teaching, related to the musculoskeletal system. Outpatient/inpatient rounds, emergency room and operating room exposure. Meets surgical specialty requirement.

462. Community Preceptorship (6) I, II, III, IV. Rodrigo Clinical experience—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. Rodrigo Clinical experience—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 aberrations at clinical level. Attention focused on basic case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. Does not meet surgical specialty requirement.

480. Insights in Orthopaedic Surgery (1-3) I, II, III, IV. Stavro Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to same methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (SU grading only.)

499. Orthopaedic Research (1-12) I, II, III, IV. The Staff (Rodriguez in charge) Clinic—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. (Does not meet surgical specialty requirement.) (SU grading only.)

Otolaryngology

Lower Division Courses

*192. Internship in Otolaryngology (1-12) I, II, III, IV. Chairperson in charge Project study—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, III. The Staff Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)

Graduate Courses

290C. Research Conference in Otolaryngology (1) I, II, III. The Staff Lecture-discussion—1 hour. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor (4 weeks). Discussion of faculty and student research in otolaryngology. (SU 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.

295. Group Study (1-5) I, II, III, IV. The Staff

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. (SU grading only)

Professional Courses

400. Suture Techniques (1) I, II, III, IV. The Staff Lecture—5 hours total; laboratory—10 hours total. Prerequisite: second- and fourth-year medical students with consent of instructor. Open to graduates and veterinary medical students. Principles of management of lacerations and the various techniques of suturing a wound.

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. Obtaining the history, application of the regions, and the art of the examination. Head minor required.

402. Otolaryngology in Family Practice (1) I, II, III, IV. Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Planned as a refresher course for those already possessing a background of knowledge in the specialty.

403. Basic Principles of Reconstructive Surgery (1) I. The Staff 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 devoted to utilizing animal tissues.

404. Otolaryngology Required Clerkship (3) I, II, III, IV. Clinical clerkship—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 Ear, Nose and Throat 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.

460. Clinical Otolaryngology Elective (3-18) I, II, III, IV. Full-time clinical activity. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Total involvement in clinical activities of the department.

465. Surgical Team Participation: Martinez VA Medical Center (6-12) I, II, III, IV. Clinical clerkship—full time (4 to 8 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 430. Student will work with Ear, Nose and Throat resident involved with inpatient care and clinics in treatment of head and neck tumors. Surgical exposure involving phototherapy and surgical reconstruction after ablative cancer surgery is stressed. Supervision and training by attending staff. (SU grading only.)

608. Insights in Otolaryngology (1-3) I, II, III, IV. Sanders Clinical experience—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.)

469. Journal Seminar (1) I, II, III, IV. Donald, Chole Lecture-discussion—1 hour. Prerequisite: third- and fourth-year medical students with consent of instructor; open to three times per quarter. Prerequisite: fourth-year medical students with consent of instructor; open to...
graduate students. Monthly review of current otolaryngologic 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, discussion and laboratory study of sensory and motor systems. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor; open to graduate students. Participation in ongoing projects.

Pathology

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff
Work-learn experience—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in pathology and related fields. (PNP grading only.)

199. Special Study in Pathology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisites: advanced undergraduate, and consent of instructor. (PNP grading only.)

Graduate Courses

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.

207. Introduction to Nervous System Pathology (1-4) I, II, III, IV. Ellis
Seminar—1-4 hours. Prerequisite: consent of instructor; open to advanced undergraduate, graduate, veterinary medical, and medical 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 parallel experimental observations.

210. Introduction to Human Pathology (5) III, C. Miller
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate or upper division students interested in the study of gross and microscopic anatomy, physiology and biochemistry. Study of the processes, causes and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, and injuries due to environmental and toxic agents. Course not intended for veterinary medical or medical students.

258. 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. Tesluk
Independent study. Prerequisite: medical student or consent of instructor. Provides a systematic study of current and historic cases with emphasis on differential diagnosis, preservation of evidence, and medical-legal procedures. Includes an introduction to histopathologic diagnosis, ballostics, and toxicology. (SU grading only.)

405. Brain-Contusion 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 presented.

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 science; 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 correlation of gross and microscopic findings in current cases; conferences discuss individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

408. Autopsy Case Studies (1-12) I, II, III, IV. Ruebner
Discussion—1-4 hours; laboratory—3-24 hours. Prerequisite: medical student or consent of instructor. Participation in and performance of an autopsy, with supervision of complete autopsies. Correlation of clinical material, gross, microscopic and laboratory findings.

411. Pathology (5) I, III, IV. Ruebner
Lectures—4 hours (five weeks only); laboratory—7 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduces basic human disease processes. Mastery of pathophysiology and vocabulary is stressed. Methods of examining gross and microscopic tissue sections are taught.

423. Systemic Pathology (8-5) IV. Cardiff
Lecture—57 hours total; laboratory—40 hours total. Prerequisite: gross anatomy—bodies. Clinical activity—full-body; Student Evaluation and Promotion. Important and common diseases of human organs system. Pathophysiologic basis of disease in the clinical setting.

424. Laboratory Medicine (3) III. Kost
Lecture—13 hours; discussion—1 hour, and laboratory—11 hours (25 hours total). Prerequisite: medical student with approval by Committee on Student Evaluation and Promotion. Course provides a fundamental knowledge of the role and application of modern clinical laboratory medicine. Emphasis upon optimization of selection of laboratory measurements; decision analysis, interpretation of laboratory results, scoring of selected problems using laboratory measurements.

434. Clerkship in Advanced Applied Surgical Pathology (5-9) I, II, III, IV. Tesluk
Clinical Clerkship—full time (4-6 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 side reading sessions as well. Students attend surgical pathology conferences and seminar sessions in which clinical correlation and diagnostic information are presented.

455. Applied Clinical Laboratory Immunology (5) II, III, Miller
Clinical Clerkship—full time (6 weeks). Prerequisite: third or fourth-year medical students with consent of instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully in all laboratory operations including bench techniques, laboratory management and quality control. (SU grading only.)

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 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. (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 various advanced topics in general, special, experimental, or comparative pathology. (SU grading only can be effect.)

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 can be effect.)

NOTE: For key to footnote symbols, see page 133.

Pediatrics

Upper Division Courses

199. Special Study in Pediatric Research (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon student preparation as determined by instructor. (PNP 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 areas 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—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on student's experience. Evaluation by student.

Clinical activity—full time (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 and Perinatology (2) I. Weinberg and staff (Pediatrics: Neonatology)
Lecture—20 hours total; discussion—2 hours total. Prerequisite: consent of committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented. Abnormalities in perinatology are approached by study of appropriate clinical problems. (Same course as Obstetrics and Gynecology 432B.)

450A. Acting Internship: General Inpatient Pediatric Clerkship (6-18) I, II, III, IV. Halsted
Clinical experience—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 function 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. (SU grading only.)

460B. Acting Internship: Outpatient Pediatrics (6-18) I, II, III, IV. Reinhart
Clinical experience—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. Students function as "Acting Intern" with appropriate supervision by residents and attending faculty. Limited enrollment.

461. Elective in Pediatric Hematology/Oncology (3-18) III. Abildgaard
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432C; 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. Conners
Clinical experience—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, V
Clinical experience—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. Diagnostic and therapeutic aspects of the medical and surgical high-risk neonate. Student expected to take night call. Limited enrollment.

465. Pediatric Specialty Clinic Elective (3-18) I, II, III, IV
Clinical experience—full time (2 to 12 weeks). Prerequisite: 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
Parish Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

467. Elective in Pulmonary Medicine (3-18) II, III, IV
McDonald, Joab Clinical experience—full time (2 to 12 weeks); daily rounds, twice weekly. Prerequisites: pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic respiratory diseases as well as congenital abnormalities.

468. Elective in Pediatric Nephrology (3-18) I, II, III, IV
Murphy Clinical experience—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 renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

469. Elective in Pediatric Infectious Disease (3-18) I, II, III, IV
Hasted Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious disease in infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV
Gospe Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV
Cannon, Werner Clinical experience—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 gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

472. Acting Internship in Pediatric Intensive Care (6-18) I, II, III, IV
Sheikh Clinical experience—full time (4 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B with grade of A or consent of instructor of record; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. Inpatient general and participation in clinical investigation may be arranged. Limited enrollment.

499. Research Topics in Pediatrics (1-18) I, II, III, IV
The Staff (Styler in charge) Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, neonatology, nephrology and others) may be arranged with faculty member. Independent research by student will be emphasized and long term projects are possible. (SU grading only)

Pharmacology

Lower Division Courses

92. Internship in Pharmacology (1-12) I, II, III, IV
The Staff (Chairperson in charge) PreWork experience—3-36 hours final report. Prerequisites: lower division student with good academic standing; approval of project prior to period of internship; Supervised work-study experience in pharmacology and related fields. (P, N, P grading only)

99. Special Study for Undergraduates (1-5) I, II, III, IV
The Staff (Chairperson in charge) Prerequisite: lower division standing. (P, N, P grading only)

Upper Division Courses

100. Pharmacology for Educators (2) I, E. K. Killian Lecture—2 hours. Prerequisite: consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of precription and non-prescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug dependency and related topics.

192. Internship in Pharmacology (1-12) I, II, III, IV
The Staff (Chairperson in charge) PreWork experience—3-36 hours; final report. Prerequisites: upper division standing; approval of project prior to period of internship; Supervised work-study experience in pharmacology and related fields. (P, N, P grading only)

197. Directed Group Study (1-5) I, II, III, IV
The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P, N, P 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, P grading only)

Graduate Courses

200A. Advanced General Pharmacology (3)
Hance and staff Lecture—with course 200B—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent. May be taken concurrently. Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs.

200AL-200BL. Advanced General Pharmacology (1-1) I, II, Stark and staff Discussion—3 hours; laboratory—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). Laboratory procedures in advanced pharmacology. Experiments and discussion designed to follow subject-matter sequence of 200A-200B.

200B. Advanced General Pharmacology (4) II
Winters 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). Laboratory procedures in advanced pharmacology. Experiments and discussion designed to follow subject-matter sequence of 200A-200B.

201. Pharmacology of the Nervous System I: 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 odd-numbered years.

202. Pharmacology of the Nervous System II: Hypnotics, Sedatives and Anesthetics (2) II, E. K. Killian Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally-acting sedative, hypnotic, and anesthetic agents with emphasis on alterations in brain function. Offered in odd-numbered years. (SU grading only)

203. Pharmacology of the Nervous System III: Stimulants and Anticonvulsants (2) II
Stark Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in even-numbered years.

204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior (1-3) I, II, J. F. Killian Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacological agents, hallucinogens, antipsychotics. Offered in odd-numbered years.

206. Pharmacokinetics (2) I

206L. Pharmacokinetics Laboratory (2) I, II
Henderson—6 hours. Prerequisite: courses 200A (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 even-numbered years.

208. Application of Computers to Pharmacology (1) I, II, III
The Staff Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

210. Fundamentals of Pulmonary Toxicology and Pharmacology (2) II
Hollinger Lecture—2 hours. Prerequisite: consent of instructor. Major toxicologic and pharmacologic aspects of the lung. Areas considered include: (1) basic lung structure and function, (2) respiratory and non-respiratory lung functions, (3) lung toxins and injury, and (4) principal drugs used in respiratory disorders.

220. Statistical Approach to Pharmacological Research (2) II
Hance Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to application of statistics in pharmacological research, including basic concepts of distributions, measures of location, dispersion and correlation, significance, probability, uncertainty, design of experiments.

297T. Tutoring in Pharmacology (1-3) I, II, III
The Staff (Chairperson in charge) Tutorial—3-9 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology. (SU 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. (SU grading only)

Professional Courses

400A. Principles of Pharmacology (4) I
Hance and staff Lecture—29 hours; discussion—16 hours; laboratory—16 hours (61 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs.
400B. Principles of Pharmacology (5) II. Winters and staff
Lecture—36 hours total; discussion—28 hours total (in clinic or seminars). Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use, and toxicity of drugs. (S/U grading only.)

409. 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. Stark
Tutoring—3 to 15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the required departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Special Study for Medical Students (1-5) I, II, III, IV. The Staff (Enrichment coordinators)
Lecture, directed reading, and/or discussion groups—3 to 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 to 12 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (S/U grading only.)

Physical Medicine and Rehabilitation

Upper Division Courses

192. Internship in Physical Medicine and Rehabilitation (1-12) I, II, III, IV. The Staff (Enrichment coordinator)
Clinical experience—3 to 12 hours. Prerequisite: completed internship program with preceptor. Supervised work-learning experience; clinical and “basic” research projects in Physical Medicine and Rehabilitation; emphasis on neuromuscular disorders; final written report. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and 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: advanced standing and consent of instructor. (P/N grading only.)

Graduate Courses

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. Bernauer
Lecture—2 hours, laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (S/U grading only.) (Same course as Physical Education 201A.)

201B. Rehabilitation and Physical Medicine (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. Bernauer
Lecture—2 hours, laboratory—1 hour. Prerequisite: medical students or graduate students with upper division course in systemic physiology or anatomy. 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 Orthopaedic Surgery 401A.)

440. Rehabilitation Medicine Clerkship (3) I, II, III, IV. Lieberman
Clinical clerkship—full time (2 weeks). Prerequisite: Third- or fourth-year medical student; consent by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiologic effects of modalities; indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

461. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. The Staff
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430, 431. Intended for non-UC medical students. Emphasis on evaluation of patients with neurologic or orthopedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation service.

462. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. The Staff
Clinical activity—full time. Prerequisite: Medical Sciences 430, 431. Intention of third year in Medical School. Emphasis on evaluation of patients with neurologic or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson.

480. Insights in Physical Medicine and Rehabilitation (1-3) I, II, III, IV. The Staff
Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to the methods and methods in rehabilitation medicine including ancillary therapies and related services. Development of knowledge and experience of musculoskeletal examination of patients. Observation of ward rounds and outpatient clinics. (S/U grading only.)

489. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience for medical students in any of a variety of areas in physical medicine and rehabilitation. (S/U grading only.)

499. Research for Medical Students (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (S/U grading only.)

Plastic Surgery

Professional Courses

Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Medical Sciences 430; consent of instructor. Total medical care of the patient including aesthetic plastic preparation, treatment, operative care, and follow-up. Developing and understanding reconstructive and aesthetic plastic surgery. Microvascular surgery included. Student rotation.

461. Dentistry for Future Physicians and Surgeons (6-8) I, II, III, IV. Thaller
Discussion—seminar—3 hours; laboratory—2 hours; clinic activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry, recognize potential dental problems; provide emergency care; have knowledge of where to refer these problems. (S/U grading only.)

470. Microvascular Surgical Techniques in Plastic Surgery (6) I, II, III, IV.
Discussion—4 hours laboratory—4 hours. Prerequisite: Medical Sciences 430. Introduction to microvascular surgery with operating microscope and microsurgical instruments. It is hoped student will learn surgical techniques enabling him/her to repair vessels as small as 1 mm by end of course.

Psychiatry

Upper Division Courses

196. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and 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: advanced standing and consent of instructor. (P/N grading only)

Graduate Courses

226. Psychiatric Implications of Legal Intervention (2) I, II. Bauer
Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be presented with emphasis on juvenile and youth court procedure. Moot court demonstrations. (Same course as Community Health 226.)

298. Directed Group Study for Graduate Students (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor.

299. Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

401. Medicine and the Mind: An Introduction to Psychiatry (2) I, II. Blacker
Laboratory discussion—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychiatry throughout the human life cycle. Includes tutorials tailored to individual student interests which will explore the biological, psychological, social, and cultural factors influencing health and illness. Includes lecture and video presentations as well as group discussion.

402. Human Sexual Dynamics (6) I, II. Blacker
Lecture—18 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal and variant human sexuality. The focus is the understanding human sexual function in health and illness.

403. Psychopathology (3) I. Maddock and staff
Lecture—24 hours total; laboratory—20 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to basic aspects in mental/emotional dysfunction. Focus on understanding the development and symptomatology of major forms of psychopathological dysfunction.

412. Psychiatry Grand Rounds (1) I, II, III, IV. Grindlinger and staff
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCSF Medical Center for presentation of selected clinical cases, presentation of lecture and research reports.

413. Outpatient Psychiatry Clerkship (6-12) I, II, III, IV. Grindlinger and staff
Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Clinical management of adult outpatients, including initial evaluation, differential diagnosis, and treatment planning. In addition to brief psychotherapy and interviewing skills, Conferences, medication clinics, and video-taping under supervision.

NOTE: For key to footnote symbols, see page 133.
418. Insights in Psychiatry (1-3) I, II, III, I. Grindlinger Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.

419. Psychiatric Emergency Clerkship (6-12) I, II, III, IV. Grindlinger Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.

420. Psychiatry: Emergency Service (6-12) I, II, III, IV. Grindlinger Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.

421. Advanced Psychiatry Clerkship: Martinsville VA Hospital (6-12) I, II, III, IV. Grindlinger and staff Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.

422. Readings in Psychiatry (1-3) I, II, III, IV. Grindlinger and staff Readings-discussion—3 to 9 hours. Independent reading of articles and topics in psychiatry. Supervision and discussion with a psychiatry faculty member. (SU grading only.)

423. Elective in Neuropsychopharmacology (3) I, II, III, IV. Grindlinger and staff Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.

424. Elective in Neuropsychopharmacology (3) I, II, III, IV. Grindlinger and staff Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Involves supervision from senior staff and psychiatric residents.
499. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Stadish in charge)
Prerequisite: consent of instructor; (S/U grading only for medical students.)

Radiology—Therapeutic

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; (S/U grading only)

Professional Courses

*464. Clinical Clerkship in Therapeutic Radiology (1.5-9) I, II, III, IV. Clinical experience—full time (16 weeks). Prerequisite: completion of third year of medical school; consent of instructor. Clinical oncology experience. Student participates in daily treatment planning conferences where all new cases are discussed with whole faculty of therapeutic radiology. Interviews and examines patients for presentation to staff, and reports on selected reading relevant to cases seen. Limited enrollment.

486. Group Study in Therapeutic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor; (S/U grading only for medical students.)

499. Research in Therapeutic Radiology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor; (S/U grading only for medical students.)

Surgery

Upper Division Courses

192. Internship in General Surgery (1-12) I, II, III, IV. The Staff
Prerequisite: work-learning experience—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 (intensive care, trauma, etc.).

199. Special Study in General Surgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only)

Graduate Course

299. Research (1-12) I, II, III, IV. Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (S/U grading only)

Professional Courses

419. Introduction to Clinical Surgery (1-6) I, II, III, IV. Ward
Clinical activity—full time. Prerequisite: second-year medical student or third-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 pathology and discuss them with members of staff.

460. Clinical Surgical Elective (3-9) I, II, III, IV. The Staff
Clinical experience—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Preparation of patients, treatment, operative care, and postoperative follow-up. Services include Surgery Clinics, Surgical Nutrition, Pediatric Surgery, Cardiothoracic Surgery, Gastrointestinal Surgery, and Burn Clinic.

461. Surgery Burn Unit Clerkship (6 or 9) I, II, III, IV. The Staff
Clinical activity—full time (4 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student. Students function 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, Bissell and staff
Clinical instruction—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 surgical 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 surgical problems and participate in their care.

Clinical activity—full time (4, 6, or 8 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. PART of the General Surgery residency training program with the University of California, Davis. The Martinez rotation has a large number of gastrointestinal and vascular surgical problems as well as broad surgical experience.

466. General Surgery Clerkship: Travis AF Base Hospital (6 or 9) I, II, III, IV. Gillmore, Ward
Clinical activity—full time (4 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Opportunity to participate on the surgical staff of our affiliated Air Force Hospital. The program has a large number of general surgery problems and provides a broad clinical experience in surgery.

476. Surgical Oncology (3-9) I, II, III, IV. Goodnight and staff
Clinical activity—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Student works on an extern on the Cardiothoracic Surgical Service, participating in preoperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted.

478. Surgical Preceptorship: Off Campus (6-18) I, II, III, IV. Ward
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff.

480. Insights in Surgery (1-3) I, II, III, IV. The Staff
Clinical experience—3 to 9 hours. Prerequisite: good academic standing and consent of instructor. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (S/U grading only)

494H. Fourth-Year Surgical Honors Program (18) I, II, III, IV. Wolfman
Prerequisite: completion of third year of Medical School with superior performance on Medical Sciences 430; consent of instructor. To provide intensive and comprehensive training in surgery to students interested in postgraduate surgical career, that would enable them to experience the internship and residency training. (S/U grading only)

498. Group Study (1-5) I, II, III, IV.
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Laboratory Research (1-36) I, II, III, IV. Ward and staff
Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (S/U grading only)

Urology

Lower Division Course

99. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Course

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 Course

299. Research in Urology (1-12) I, II, III, IV. Deutch, deWeire White in charge
Prerequisite: graduate standing and consent of instructor. (S/U grading only)

Professional Courses

400. Office Urology (1) I, II, III, IV. DeVere, White
Clinical activity—4 hours in afternoons (6 weeks). Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized.

420. Urinary System (3.5) I, III, Stone, Bogusky
Lecture—24 hours, discussion—18 hours, and laboratory 10 hours (52 hours total). Prerequisite: approval of Correlative Student Evaluation and Promotion. Fundamental aspects of (a) disorders of body water, electrolytes and acid/base balance; (b) major categories and mechanisms of parenchymal renal diseases; (c) major congenital and acquired urologic diseases; (d) urinary tract infections. (Same course as Internal Medicine 420E)

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. Externalship in Urology (5-18) I, II, III, IV, deWeire White
Clinical activity—full time. Prerequisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.
Medieval Studies 319

Medieval Studies

(College of Letters and Science)

Dennis J. Dutschke, Ph.D., Program Director
Program Office, 822 Sprout Hall (916-752-1219)

Committee in Charge

Samuel G. Armstrong, Ph.D. (Spanish)
Dennis J. Dutschke, Ph.D. (Latin)
Ingeborg Henderson, Ph.D. (German)
Winder McConnell, Ph.D. (German)
David A. Nutter, Ph.D. (Music)
Marjorie Oeborn, Ph.D. (English)

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 beginnings of the Renaissance. Medieval studies are inherently interdisciplinary. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

A.B. Major Requirements:

Preparatory Subject Matter


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, 201B, 201C

UNITs

History, at least 12 units from History 102B, 121A, 121B, 121C, 201B, 201C

NOTE: For key to footnote symbols, see page 133.
Literature: at least 16 units, including two courses from each of the following classes....
(a) English 111, 113A, 113B, 150A, 186, 189.
(b) French 115, 141.
(c) German 120, 122.
(d) Italian 113, 115A, 115B, 139B, 140.

Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190; Religious Studies 102, 110, 115, 176, 180.

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, 112.

Political thought, at least one course from Political Science 115, 116, 118A, 118B.

Senior thesis, Medieval Studies 190.

Total Units for the Major: 52

Minor Adviser: D. J. Dutschke (Italian), W. McConnell (German), J. J. Murphy (Rhetoric), M. Osborn (English).

Minor Program Requirements:

UNITS

Medieval Studies: 24

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. Course 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 Advisor.

Minor Adviser: D. J. Dutschke (Italian), W. McConnell (German), J. J. Murphy (Rhetoric), M. Osborn (English).

Courses in Medieval Studies:

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 Codes of Justinian, the Confessions of St. Augustine, The Chronicles of the Nibelungenlied, the Song of Roland. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 19, History 4A, or Comparative Literature 1 or 2.

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 St. Thomas Aquinas, the Chronicles of Froissart, The Canterbury Tales of Chaucer, and the Divine Comedy of Dante. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 19, History 4A, or Comparative Literature 1 or 2.

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/Non-Introductory. Recommended GE preparation: Art 19, History 4A, or Comparative Literature 1 or 2.

98. Directed Group Study (1-5) I, II, III.

The Staff (Chairperson in charge).

(PNPin grading only.)

99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge).

(PNPin 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. Students will vary from year to year and cover such topics as:

(a) The Monastic Orders;

(b) The Emergence of Universities;

(c) The Seven Liberal Arts and Their Significance in the Middle Ages;

(d) Family and Society;

(e) Church and State.


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 curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (PNPin grading only.)

198. Directed Group Study (1-5) I, II, III.

The Staff (Chairperson in charge).

(PNPin grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge).

(PNPin grading only.)

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Mexican-American (Chicano) Studies

See Chicano Studies

Microbiology

See Microbiology, below: Microbiology (A Graduate Group); Medical Microbiology; and Veterinary Microbiology and Immunology

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Microbiology

(College of Letters and Science)

Mark L. Wheelis, Ph.D., Acting Chairperson of the Department

Department Office, 156 Hutchinson Hall

(916) 730-0262

Faculty

Stanley W. Arzt, Ph.D., Associate Professor

Paul Baumann, Ph.D., Professor

Robert E. Hungate, Ph.D., Professor Emeritus

John L. Ingraham, Ph.D., Professor Emeritus

Daniel J. Klionsky, Ph.D., Assistant Professor

Jafar A. Manning, Ph.D., Professor

Allen G. Morey, Ph.D., Professor

John C. Meeks, Ph.D., Professor

Douglas C. Nelson, Ph.D., Associate Professor

Herman J. Pfaff, Ph.D., Professor Emeritus (Food Science and Technology)

Wilfrid J.C. Pfaffer, Ph.D., Senior Lecturer

(Microbiology, Biological Sciences)

David Pratt, Ph.D., Professor Emeritus

Martin L. Privalsky, Ph.D., Associate Professor

Mark L. Wheelis, Ph.D., Senior Lecturer

The Major Programs

Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The B.S. program emphasizes the biology of bacteria while the B.S. program includes more biochemistry and related course work. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine, various allied health professions including medical technology, or teaching. The B.S. program is especially well suited for students who want a professional career in microbiology, or who wish to pursue graduate education in a biological science discipline. The choice of a major program and its suitability for particular career options should be discussed with a major advisor.

Students majoring in Microbiology 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 material as upper division courses in the subject at UC Davis.

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.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter: 47-60

Biological Sciences 1A, 1B, 1C

Chemistry 1A, 1B

Chemistry 9A, 8B or 128A, 128B, 128C, 129A

Statistics 13

Mathematics 16A-16B or 21A-21B

Physics 1A, 1B, or 5A, 5B, 5C

Depth Subject Matter: 38-40

Microbiology 102, 102L, 103, 103A

Two of the following: Microbiology 110, 110L, 120-120L, 130B-130L, 177, 177L

Biochemistry 101A, 101B

Microbiology 162 or Veterinary Microbiology 126

Additional units from: Microbiology 110, 110L, 120, 120L, 130B, 130L, 177, 177L, Biochemistry 101L, Botany 114, 118, 119; Veterinary Microbiology 126, 127

Total Units for the Major: 85-100

NOTE: For key to footnote symbols, see page 133.
3. Bacteriological Laboratory Techniques (1.1) I. The Staff Laboratory—3 hours. Prerequisite: Chemistry 1A. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accomplishing work resting with student. (P/NP grading only)

20. Biology of Microorganisms (4) Ii. The Staff Lecture—3 hours; term paper. Prerequisite: Biological Sciences 10. Survey of the diversity of microorganisms (viruses, bacteria, protozoa), their metabolism, genetics, and habitat. Emphasis on importance to humans—role of microorganisms in global ecological cycles, in food production, and in disease. General Education credit: Nature and Environment/Non-science. Recommended GE preparation: Biological Sciences 10.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

Upper Division Courses

102. General Bacteriology (4) I. Baumann, III. Marr Lecture—4 hours. Prerequisite: Psychological Sciences 1A or 1B and Chemistry 8B (may be taken concurrently). Survey of the biology of bacteria and viruses, including bacterial structure, physiology, genetics, and evolution; viral structure and replication; the role of bacteria in global ecological cycles; and the role of microorganisms in disease. Only one unit of credit allowed if student has previously passed course 2.

102L. General Bacteriology Laboratory (2) I, II. Pfenninger Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently). Introduction to principles and laboratory methods employed in working with microorganisms. For students planning to continue study of microorganisms as tools for study of genetics and biochemistry. Only one unit of credit allowed if course 3 has been taken.

105. Bacterial Diversity (5) I. Nelson Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 102, 120L, and Biochemistry 101A; Biochemistry 101B recommended. Survey of the major groups of bacteria emphasizing diversity of energy metabolism, morphology, and natural history. Includes methods for determination of evolutionary relationships among groups. Isolation and characterization of bacterial strains from various habitats.

110. Bacteriology of Insects (3) I. Baumann Lecture—3 hours; laboratory—6 hours; 2 credits. Prerequisite: 101 or 102. Physiological basis of pathogenic and symbiotic associations between prokaryotes and insects. Taxonomy, physiology, pathogenesis, and molecular biology of insect pathogenic bacteria. Symbiotic and mutualistic associations between microorganisms and insects. Pertinent entomological background information will be included in the lectures.

110L. Bacteriology of Insects Laboratory (2) I, II. Baumann Laboratory—6 hours. Prerequisite: course 3 or 120L; course 110 (may be taken concurrently). Practical experience in the isolation, cultivation, physiology, genetics and taxonomy of selected insect and plant pathogens. Bioassay of toxins and observations on the mechanisms of pathogenesis. Offered in odd-numbered years.

120. Microbial Ecology (3) III. Meeks Lecture—3 hours. Prerequisite: course 106; Biochemistry 101A: Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

120L. Microbial Ecology Laboratory (2) III. Meeks Laboratory—6 hours; one optional overnight weekend and field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done. Student selection of experimental procedures for those projects.

130A. Bacterial Physiology and Genetics (3) II. The Staff Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently). Mathematical 16A. Physiology and regulation of bacterial growth including the effect of the environment. Mapping techniques and use of mutants in problem solving.

130B. Bacterial Physiology and Genetics (3) III. Arzt Lecture—3 hours. Prerequisite: course 130A. Gene regulation. Prokaryotic nitrogen metabolism. Structure and function of the bacterial cell envelope: synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

130L. Bacterial Physiology Laboratory (3) III. Arzt Laboratory—9 hours. Prerequisite: course 130A and either course 3 or 130L. Physiology and genetics of bacteria and bacterial viruses. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction. Studies on control of enzyme synthesis by induction, repression, and catabolic repression.

162. General Virology (4) I. Manning Lecture—4 hours. Prerequisite: Biological Sciences 1A and Biochemistry 101B (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

177. Metabolism of Anaerobic Bacteria (3) II. Macy (Animal Science) Laboratory—6 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

194. 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 department. Continuation of an individual microbiological research project culminating in a master's thesis under a faculty director. (P/NP grading only)

197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1.5 hours. Prerequisite: course 3 and 102B; or consent of instructor. Experience may be repeated for a maximum of 3 units when subject matter differs. (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)
Microbiology (A Graduate Group)

John C. Meeks, Ph.D., Chairperson of the Group
Office, 156 Hutchinson Hall (Microbiology Department), (916-752-0292)

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. For information on the graduate study and undergraduate preparation for the program contact a graduate advisor or the Chairperson of the group. See also the Graduate Division section in this catalog.

Graduate Advisers. B. L. Beaman (Medical Microbiology); R.B. LeFevre (Veterinary Microbiology and Immunology); J.C. Nelson (Microbiology); D.M. Ogdykzil (Food Science and Technology).

Courses in Microbiology

Graduate Courses

209C. Advanced Research Conference (1) I, II, III. The Staff (Meeks in charge)
Discussion-conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (SU/grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion-conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (SU/grading only.)

291. Selected Topics in Bacteriology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (SU/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. (SU/grading only.)

296. Seminar in Animal Virology (1) I. Manning
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (SU/grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisites: consent of instructor. (SU/grading only.)

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

Faculty
Lieutenant Colonel Michael P. Tucker, Professor
Major John F. Campbell, Assistant Professor
Major John Cara, Assistant Professor
Captain Robin B. Friedman, Assistant Professor

Program of Study
The Military Science Department extends the educational opportunities and provides extracurricular activities which qualify a student for a commission in the Army Reserve, National Guard, or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civilian careers. A continuing effort is made to assign graduates to military career fields aligned with their academic field of study, individual capabilities and preferences in one of seventeen career fields (i.e., Infantry, Engineer, Aviation, Medical Service Corps, Armor, Military Intelligence, etc.). Active duty obligation for ROTC graduates will not exceed four years for those who choose Active Duty or six months for those who choose Reserve Component Duty. The total combined service obligation is eight years.

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 a lower division course or a lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two-year program. All other provisions explained above for the upper division course apply to the two-year program.

Scholarship Program
The U.S. Army offers four-, three-, and two-year Active Duty and Reserve Forces Duty scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship pays for your college tuition, laboratory fees, on-campus education fees, attendance at Advanced Camp, and a flat rate amount from which you may purchase textbooks, classroom 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.

The Army Reserve Officers' Training Corps four-year Active Duty or four-year Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. There are two cycles available for submission of the four-year scholarship application. High school juniors can compete for an Early Cycles...
scholarship by submitting their application complete and postmarked by 15 July between their junior and senior years. Applicants will receive notification of their final status by 1 November. As high school seniors, they must have applied to the ROTC scholarship program by submitting their application complete and postmarked by 1 December. Those applicants not selected in the Early Cycle are considered in the Regular Cycle competition. Applicants will receive notification of their final status by 1 March of their senior year in high school. Interested applicants should see their high school counselor for an application, or contact UC Davis, Department of Military Science.

The three-year Active Duty and two-year Active and Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a junior college to UC Davis, and have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is 15 January for the two-year scholarship and 15 February for the three-year scholarship. Additionally, students must have scholarship at the six-week summer 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 workforce 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 with a degree in either science or engineering and enroll, or be enrolled, in the U.S. Army Senior ROTC Program. A first semester freshman applicant needs a high school minimum cumulative average of 3.25 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 civil employee may set their standards above these averages. Students choose to serve in either the Active Army or a Reserve Forces 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 Sciences Program Manager.

Leadership Laboratory

During the course of the school year, several week-ends and two hours per week are spent in the conduct of practical exercises. Classes emphasize adventure activities including offense, defense and patrolling techni ques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership training and to prepare for attendance at the Army ROTC Advance 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 commissionees to begin military service. The components of the MQS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 67 military skills which are categorized into 12 subject areas. They are basic soldiering tasks fundamental to the military profession and are a basis for future branch-directed specialty training.

The 19 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership and ethics, administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of five designated fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Grads will be determined by the Dean. Units may apply for direct commission in the United States Army Veterinary Corps.

Courses in Military Science

Lower Division Courses

11. Roles and Organization of the U.S. Army (1).

Lecture—1 hour. Prerequisite: lower division status. Introduction to leadership theories used in military organizations. Course surveys the duties and responsibilities of junior Army officers, the general environment that officers lead, and the leadership roles performed. Introduces military map reading.

13. Introduction to Basic Military Operations (1).

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 military first aid. Principles of war as introduced in course 11 are applied to offensive and defensive tactics.

14A. Introduction to Military Leadership Skills (1)

Lecture—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. (PnP grading only.)

14B. Introduction to Military Leadership Skills (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 element of the Army. As student gain capabilities, supervisory controls are reduced. (PnP grading only.)

14C. Introduction to Military Leadership Skills (12).

Laboratory—2 hours. Prerequisite: lower division status 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. Interrelation of squad and platoon organizations is explored. (PnP grading only.)


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 (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).

Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits 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 (12).

Lecture—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. (PnP grading only.)

24B. Individual Military Leadership Skills (12).

Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Personal supervisory and leadership skills are developed in a supervised laboratory environment. Students are rotated through squad and team-level supervisory positions, given responsibility concomitant with positions. (PnP grading only.)

24C. Individual Military Leadership Skills (12).

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. (PnP grading only.)

Upper Division Courses

131. Advanced Military Leadership and Management (2).

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 counseling techniques, and introduces basic management skills. Instruction provided on the various branches in which a commissioned officer could serve.

132A. Advanced Military Operations (2).

Lecture—2 hours. Prerequisite: upper division status; course 22B or consent of instructor. First phase of
advanced military tactical operations. Advanced work on topographical maps, navigation, and orienteering techniques. Instruction is also provided on resource planning and logistics intelligence.

132B. Advanced Military Operations (2).

Lecture—2 hours. Prerequisite: upper division status; course 132A or consent of Instructor. Continuation of course 132A. Military tactical theories and their application in offense and defense are presented at the battalion and company level. Course covers in-depth analysis of the principles of war related to offensive and defensive operations.

134A. Military Organizational Leadership Skills (1/2).

Laboratory—2 hours. Prerequisite: upper division status; course 24A-24B-24C or consent of Instructor. Students develop interpersonal and management skills by practicing the application of leadership in military organizations in a supervised leadership laboratory. Advanced-level military skills presented. Students fulfill the roles of senior non-commissioned officers. (P/NP grading only.)

134B. Military Organizational Leadership Skills (1/2).

Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of Instructor. Students prepared for advanced summer training experience by extensive requirements to plan, organize and conduct military operations in field environments; individual leadership potential is closely assessed in the laboratory environment. (P/NP grading only.)


Lecture—2 hours. Prerequisite: upper division status and course 131. Army decision making, personnel and equipment management. Includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

142. Military Law (2).

Lecture—2 hours. Prerequisite: upper division status and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

144A. Military Training Leadership Skills (1/2).

Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Develops and exercises the leadership skills necessary to plan, coordinate, and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor planning, media utilization and evaluation of learning. Students perform as cadre officers. (P/NP grading only.)

144B. Military Training Leadership Skills (1/2).

Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Requirements for training of all other levels of the command structure. Students for conduct in laboratory environment (under supervision). Students placed in realistic role of junior officer with appropriate level of responsibility. Students perform as cadre staff officers. (P/NP grading only.)

Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program established at California State University, Sacramento (CSUS). UC Davis participation is large, with about 30 percent of the corps coming from that campus. The CSUS Department of Aerospace Studies (AFROTC) offers a two- or four-year program leading to a commission in the United States Air Force. All course work (12 or 16 semester units) is completed on the CSUS campus with the exception of Field Training conducted during part of the summer at an active Air Force base between the student's sophomore and junior years. Upon completion of the program (integrated with UCDS's quarter system) and all requirements for the Bachelor's degree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training after graduation, and serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of entry on active duty to continue their education or may apply for Air Force sponsored graduate studies to begin immediately upon entry on active duty. Due to firm scheduling requirements for the AFROTC program, students are encouraged to work closely with their academic advisors in planning this academic program. Application to the AFROTC Program should be no later than the middle of the student's sophomore year. Contact representatives in the Aerospace Studies Department at CSUS, telephone (916) 278-7315, for information on the program or processing of entry. (An AFROTC Program is also available within the UC system at Berkeley campus, Department of Aerospace Studies. (415) 642-3572.)

AFROTC offers 3 1/2-, 3-, 2 1/2-, and 2-year scholarships to qualified students. Applications are accepted in a variety of academic disciplines; however, particular emphasis will be given to applicants in the fields of engineering, navigation, and meteorology.

Naval ROTC

Naval ROTC is available to UC Davis students through a cross-enrollment program with the University of California at Berkeley (UCB). Full credit for UCB courses will be given by UC Davis and grades for these courses will appear on University transcripts. Students who successfully complete the NROTC program receive commissions as Ensigns in the United States Navy or Second Lieutenants in the United States Marine Corps. Specific questions concerning this program should be directed to the Professor of Naval Science, 25 Callaghan Hall, UCB, Berkeley, CA 94720 (415-642-3551).

NROTC offers 2-, 3-, and 4-year scholarships to qualified applicants on a nationally competitive basis. Scholarships provide uniform, tuition, book costs, and $100 per month subsistence. Students are required to attend weekly professional laboratories (drill) at UCB and complete required Naval Science courses. Drills and courses are normally offered on Wednesdays in the late afternoon and evening. These drill sessions offer the midshipmen an active role in the management and direction of the student battalion and provide a time period for midshipmen to explore professional topics. Scholarship and senior college program students participate in four to six-week summer training cruises aboard naval ships throughout the world.

Music

(Bachelor of Arts in Music)

Major Program

The Department of Music offers a unique program of study for a career in music as part of a broadly-based liberal arts education leading to the Bachelor of Arts degree. The student engages in the study and performance of music of all styles and periods. Options are provided for those students with special interests in composition, history, teaching, and performance, and for those who plan to continue in graduate work in music.

A. B. Major Requirements:

Preparatory Subject Matter


NOTE: For key to footnote symbols, see page 133.
Music 30, 31 (or the equivalent as determined in consultation with major advisor), one year.................................3
Piano skills, Music P (required of all majors)..........................................................0
Depth Subject Matter.................................38
Music 104A, 104B, 104C..........................12
At least 12 units selected from Music 121, 122, 123, 124, 125, 126, 127
At least 8 units in performance courses ........................................8
Selected from Music 130 or 131, 141, 142, 143, 144, 145, 146.
Total Units for the Major..................................................52

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with The Little Preludes of Bach is prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music P. 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 advisors 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:

UNITS

Music ..............................................................18
A minimum of eighteen units of upper division Music courses is required, at least six units of which must be at the 100 level. One of the following courses must be included: Music 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146.

Courses in Music

Lower Division Courses

P. Rudimentary Plane (P) (0) I, II, III, The Staff
Laboratory—1 hour. Prerequisite: Music majors and minors enrolled in course 4 (concurrently). Designed to train students to meet the minimal piano requirements for the major or minor in music. (P/NP grading upon completion of term.)

1. Basic Musicianship (3) II, III, Anderson
Lecture—3 hours. Fundamentals of music, singing, ear-training, and theory preparation 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 managers, and stage managers. Not open to students who have completed successful course 3A, 4A, or the equivalent.

3A. Introduction to Music Theory (4) I. Bloch; II. Lust; III. The Staff
Lecture—3 hours; laboratory—1 hour. 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 nonscience courses (3A-3B) which satisfies major requirement for one course: Civilization and Culture/Introductory.

3B. Introduction to Music Theory (4) I. Niederberger; II. Bloch; 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 satisfies major requirement for one course: Civilization and Culture/Introductory.

4A-4B-4C. Elementary Theory (5-5-5) I. Frank, Niederberger; III. Bauer, Niederberger
Lecture-discussion—4 hours; practicum—2 hours. Development of music writing and listening skills through the study of music fundamentals, tonal species, counterpoint, harmony, score reading, analysis of repertoire. Intended primarily for music majors and minors.

5A-5B-5C. Intermediate Theory (4-4-4) I, II, Ill, Valente
Lecture-discussion—3 hours; practicum—2 hours. Prerequisite: course 4A. Study of major tonal concepts and counterpoint and of harmony; keyboard harmony; analysis of repertoire.

10. Introduction to Musical Literature (4) I. Wilson, Pitman, Schultz; II. Bloch, Wilson, Pitman; III. Wilson, Pitman, and others
Lecture—3 hours; listening section—1 hour. An introduction to composers and major styles of Western Music. Lectures, listening sections, and selected readings. For non-majors, General Education credit: Civilization and Culture/Introductory.

24A. Introduction to the History of Music, I (4) I. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 2A or 3A (concurrently). Intended primarily for majors and minors in music. History of music from the late Baroque to the Classical Period.

24B. Introduction to the History of Music, II (4) II. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 2A; course 48 or 3B (concurrently). Intended primarily for majors and minors in music. History of music from the Classical Period to the nineteenth century.

24C. Introduction to the History of Music, III (4) III. Reynolds
Lecture—3 hours; listening section—1 hour. Prerequisite: course 2A; course 48 or 3B (concurrently). Intended primarily for majors and minors 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. Prerequisite: 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.

25B. Introduction to the History of Music, V (4) II. Busse Berger
Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5A and 25A; course 5B (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from around 1400 to around 1600.

25C. Introduction to the History of Music, VI (4) III. Busse Berger
Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5B and 25B; course 5C (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from around 1600 to around 1680.

28. Introduction to Afro-American Music (4) II. Pitman
Lecture—3 hours; listening and discussion—1 hour. A study of the Afro-American rhythm, field hollers, work songs, spirituals, blues, gospel, and jazz, the contrast between West African, Afro-Caribbean, and Afro-Cuban musical traditions.

Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertoire; admis- sion by audition and consent of instructor. Class, instruction, arranged by section: (A) Voice (prerequi- site 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) English Horn; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viol da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.

Performance instruction—1/2 hour; practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Indi- vidual 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) Viol da gamba; (U) Recorder. May be repeated for credit.

41. University Symphony (2) I, II, III, Holoman Rehearsal—4 hours. Prerequisite: admission subject to audition before the first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of music from the orchestral literature. May be repeated for credit. (P/NP grading only.)

42. University Chamber Singers (2) I, II, III, The Staff
Rehearsal—3 hours, plus sections—at least 1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance of works for small choral group. May be repeated for credit. (P/NP grading only.)

43. University Concert Band (2) I, II, Valente; III, The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeat- ed for credit. (P/NP grading only.)

44. University Chorus (2) I, II, III, The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (P/NP grading only.)

45. Early Music Ensemble (2) I, II, III, Nuter
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

46. Chamber Music Ensemble (1) I, II, III, The Staff
(Chairperson in charge)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, The Staff
(Chairperson in charge)
(P/NP grading only.)

NOTE: For key to footnote symbols, see page 133.
Upper Division Courses

104A-104B-104C. Advanced Theory (4-4-4) I-II-III.
Bauer
Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures; analyses and projects in composition.

107A. Computer and Electronic Music (3) I.
Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. (Limited enrollment.)

107B. Computer and Electronic Music (3) II.
Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. (Limited enrollment.)

107C. Computer and Electronic Music (3) III.
Slawson
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107B and consent of instructor. Continuation of course 107B. (Limited enrollment.)

*108A-108B. Orchestration (2-2) II, III, The Staff
Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and their practical applications in various instrumental combinations.

109. Masterworks in Performance (2) I.
Holoman
Lecture—2 hours. Prerequisite: course 109 recommended. Thorough score study of a single masterwork in the repertoire spanning the contemporary period and his contemporaries. Lectures, discussions, guided reading sections, and selected readings. Recommended for non-majors. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-B or 10.

Bach, Nutt.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-B. The study of Beethoven's music. Major works, including his symphonies, sonatas, and overtures, is discussed in detail. Readings are selected from the critical literature on the composer. (Limited enrollment.)

111. Choral Conducting (2) II.
The Staff
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral ensembles.

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.

113A. Music of Non-Western Civilizations (2).
Lecture—2 hours; listening—section—1 hour. Prerequisite: course 25A. Study of the native music of Asia, Africa, and the Americas. Offered in non-semester years.

113B. Music of Non-Western Civilizations (2) II.
Lecture—2 hours; listening—1 hour. Prerequisite: course 25A. Study of the native music of Africa and the Western Hemisphere. Course 113A is not prerequisite to 113B. Offered in even-numbered years.

121. Topics in Music History and Criticism (4).
Bloch
Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and consent of instructor. A study of 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).
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.

129. World Music (4).
The Staff
Lecture—3 hours; listening—1 hour; selected readings. Prerequisite: course 3A-B or 10 recommended. Historical and geographical studies of non-Western music, including appropriate instrumental and performing techniques, analyses of tonal systems, melodic, rhythm, and musical structures. Emphasis placed on cultural contexts of the music. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-B or 10.

The Staff
Performance—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) Viol da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.

Performance—1/2 hour; practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction: (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) Viol da gamba; (U) Recorder. May be repeated for credit.

141. University Symphony (2) 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 works for small chamber group. May be repeated for credit. (PNP grading only.)

142. University Chamber Singers (2) I, II, III. The Staff
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 chamber group. May be repeated for credit. (PNP grading only.)

143. University Concert Band (2) I, II, Valente; III, The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (PNP grading only.)

144. University Chorus (2) I, II, III. The Staff
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (PNP grading only.)

145. Early Music Ensemble (2) I, II, III. Nuter
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (PNP grading only.)

146. Chamber Music Ensemble (1) I, II, III. The Staff (Chairperson in charge)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (PNP grading only.)

190. Senior Seminar in Music (4) I. The Staff (Nuter in charge)
Lecture—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor; course 104C recommended. Intended primarily for majors in music intending to apply for graduate programs in music history, composition, or theory. Review of musical skills, issues in theory and analysis, and the history and literature of music.

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PNP 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 methodology to writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.

202. Notation (4) III. Busse Berger
Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music.

203A-203B-203C. Composition (4-4-4) I, Frank; II, Bauer; III, Swift
Seminar—3 hours. Technical projects and free composition.

204. Conducting (3) I, II, III. The Staff (Holoman in charge)
Tutorial—2 hours; practical—2 hours. Prerequisite: courses 111, 112, or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading rehearsed groups.

207. Advanced Electronic and Computer Music (4) II.
Swift
Seminar—2 hours; plus individual student/instructor meetings—2 hours. Prerequisite: courses 107A-107B-107C. Advanced course in electronic and computer music with the Sun 3-based computer-music system and associated facilities.

210A. Proseminar in Music (Theory and Analysis) (4) I.
Swift
Seminar—3 hours; term paper. Voice-leading analy-
Native American Studies

(Physics of Music and Science)
Jack D. Forbes, Ph.D., Program Director
Program Office, 100 FSH 317-752-3272

Committee in Charge
Jack D. Forbes, Ph.D. (Anthropology, Native American Studies)
David A. Robinson, Ph.D. (English)
Lenora A. Timm, Ph.D. (Linguistics)
Deborah L. True, Ph.D. (Anthropology)

Faculty
Jack D. Forbes, Ph.D., Professor
Carl N. Gormas, M.A., Lecturer Emeritus
Inez Henderson, Assistant Professor
Sara Hutchison, M.A., Lecturer Emeritus
George C. Longfith, M.F.A., Professor
David J. Rilling, M.F.A., Senior Lecturer

The Major Program

Native American Studies focuses upon the indigenous peoples of the Americas, that is, upon the peoples, nations, and tribes whose ancestors have lived in both North and South America for thousands of years. Native American Studies is interdisciplinary in its approach to the world of American Indian peoples, offering a comprehensive and comparative perspective.

The major in Native American Studies is designed to fulfill several purposes. First, it is intended as a broad interdisciplinary undergraduate program bridging the humanities and social sciences through the medium of studying the philosophy, values, society, politics, way of life, and development through time of the indigenous peoples of the Americas. Second, it is designed to provide students with concrete insight into the cultural and historical complexity of Native American peoples as well as the specific diversity in which this fundamental unity is expressed throughout the hemisphere. Third, the major is intended to develop research capabilities, critical intelligence, and to foster an understanding of the broad human experience both in the past and present, by means of coursework and fieldwork which will enhance an appreciation of Native American life and thought as the vehicle for the analysis, comparison, and synthesis. Fourth, the major is intended to foster the student's creative development and to illustrate how, in the lands and institutions of Native American life, the aesthetic and artistic aspects are an integral part of the cultural whole.

Native American Studies is also a practical major for those considering a professional career such as teaching, law, human services, health, tribal administration, and inter-ethnic relations, among other fields. Graduate schools or institutions in these and related areas are often looking for students who are broadly prepared in an interdisciplinary manner and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity. Specifically, schools and agencies are increasingly looking for personnel with expertise in relation to Native American peoples since they comprise a rapidly growing population throughout the hemisphere.

Students electing a major in Native American Studies may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly upon the Native experience in North America (north of Mexico). The purpose of Plan II is to encourage interest in the history of the Native American and South American area. Plan III is intended to encourage students to focus upon South America with, however, some coursework in the area from the North American and South American area. Plan IV is intended to encourage students to focus upon South America with, however, some coursework in the area from the North American and South American area. Advisers will be encouraging students in developing their topics for research papers and projects, to concentrate upon one of these three regions in accord with the plan they have selected.

A.B. Major Requirements:

Preparatory Subject Matter (Plans I, II, and III) 20
Native American Studies 1
Native American Studies 32, 33, 55, 70, or three of the above courses and one course from History 17A, History 22, or Anthropology 216

Depth Subject Matter (Plans I, II, and III) 16
Native American Studies 130A 4
Native American Studies 130B or 130C 4
Native American Studies 157 4
Native American Studies 180 4

Plan I (North American Emphasis) 20
Preparatory Subject Matter (see above) 20
Depth Subject Matter (see above) 16
Two courses from Native American Studies 118, 119, 120, 124 8
Two courses from Native American Studies 101, 181A, 181B, 181C 8
Two courses from Anthropology 113, 134, 141A, 141B, 141C, 152, 173, 174, 175, 176, Geography 120, History 173A 8
One other upper division Native American Studies course, selected in consultation with your major adviser 8
Total Units for the Major, Plan I 64

Plan II (Mexico-Central America Emphasis) 20
Preparatory Subject Matter (see above) 20
Depth Subject Matter (see above) 16
Three courses from History 161A, 161B, 161C, 166A, 166B, Geography 122A 12
Two courses from Anthropology 134, 141A, 141B, 174, 175, Native American Studies 161 8
One course from Spanish 129, 135, Art 151 4
One course from Native American Studies 101, 161A, 161B, 161C, or from Native American Studies 107, 185, 191 if specifically focused upon a Mexican-American language or topic 4
Total Units for the Major, Plan II 64

Plan III (South American Emphasis) 20
Preparatory Subject Matter (see above) 20
Depth Subject Matter (see above) 16
Three courses from History 161A, 161B, 162, 163A, 163B, 165, Geography 122B 12
Two courses from Anthropology 134, 141A, 141B, 144, 174, 175, Native American Studies 161 8
Two courses from Native American Studies 101, 181A, 181B, 181C, Spanish 149, or from Native American Studies 107, 185, 191 if specifically focused upon a South American language or topic 8
Total Units for the Major, Plan III 64

Minor Adviser: D. Rilling.

Minor Program Requirements:
The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to coursework dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

Native American Studies 24
Lower division requirement 4
Upper division requirement 20

NOTE: For key to footnote symbols, see page 133.
Five upper division courses, at least one of which is chosen from each of the following groups:

Ethno-History, Native American Studies
- 130A, 130B, or 130C
- Philosophy and values, Native American Studies
- 156, 157, or 158
- Politics and current affairs, Native American Studies
- 116, 117, 118, 124, or 161

Art and literature, Native American Studies
- 101, 191A, 191B, or 191C

Courses in Native American Studies

Lower Division Courses

1. Introduction to Native American Studies (4) II, III, Rising.
   Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture; relationships of Native American Studies to other academic disciplines.

2. Native American Experience (4) I, II, III. The Staff
   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/Introduction.

3. Native American Music and Dance (4) I. The Staff
   Lecture—3 hours; discussion—1 hour. Introduction to the music and dance of the native peoples of the U.S. Students will study secular native dance and drama 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 design, media, and function. Intended 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 techniques and research in 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. Americanisms: Native American Contributions to World Civilization (4) II. The Staff
   Lecture—4 hours. Prerequisite: course 1. Analysis and study of Americanisms: traits, inventions, and developments originated in the Americas by native peoples and adopted by other peoples.

70. Native American Perception (4). I. The Staff
   Lecture—4 hours. Prerequisite: course 1. Study of the culturally determined attitudes, values, and relationships of American-Indian people and the differences in perception between Native Americans and the dominant society.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Forbes in charge)
   Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

*101. Contemporary Indian Art (4) I. Longfish
   Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the two art centers of Oklahoma and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined.

107. Special Topics in Native American Languages (4) I, II, III. The Staff
   Lecture-discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied.

112. History and Culture of the "Five Civilized Tribes" (4) I. The Staff
   Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Historical and cultural aspects of the five major Native American tribes which flourished in the southern part of the U.S., called the "Five Civilized Tribes." Offered in odd-numbered years.

115. Native American Traditional Governments (4) II. Rising
   Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in even-numbered years.

117. Native American Governmental Decision Making (4) II. Rising
   Lecture—4 hours. Prerequisite: course 116; Political Science 2; Anthropology 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Offered in odd-numbered years.

118. Native American Politics (4) III. Rising
   Lecture—4 hours. Prerequisite: course 117. Examination of the relations of Native American 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 even-numbered years.

124. Contemporary Affairs of Native Americans in California (4) III. Rising
   Lecture—4 hours. Prerequisite: course 1, Study of the contemporary problems, issues, and developments involving Native Americans, both urban and rural, in California.

120A. Native American Ethno-Historical Development (4) I. Forbes
   Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history in North America before 1770’s. General Education credit: Civilization and Culture/Introductory. Recommended GE preparation: Native American Studies 1 or 10; History 17A.

120B. Native American Ethno-Historical Development (4) II. Forbes
   Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America, 1770-1890. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 1, 10, or 130A; or History 17A or 17B; or Anthropology 2.

120C. Native American Ethno-Historical Development (4) III. Forbes

156. Native American Ethics and Value Systems (4). I. The Staff
   Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior, attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory.

NOTE: For key to footnote symbols, see page 135


157. Native American Religion and Philosophy (4) II. The Staff
   Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thinking of Native American people with emphasis upon the Apache. Offered in odd-numbered years.

161. Native American Community Development (4) III. The Staff
   Lecture—4 hours. Prerequisite: course 1; Applied Behavioral Sciences 151. Application of community development theory and techniques to the development problems of American Indian reservations and communities under the control of one or more governing bodies. Offered in odd-numbered years.

171. Counseling the Native American (4) II. The Staff
   Lecture—4 hours. Prerequisite: Education 163 and one course in psychology or human development; course 70 recommended. Theory and practice of counseling to reveal the subjective, cultural, and interfering differences between Native Americans and the dominant culture.

180. Native American Women (4) III. Hernandez
   Lecture—4 hours. Prerequisite: upper division standing; course 70 and Women's Studies 50 recommended. Social and cultural foundations of the Native American woman's position and the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical texts will be utilized. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 10 and Women's Studies 50.

181A-181B-181C. Native American Literature (4-4-4) III-II-II. The Staff
   Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry, oral literature, songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), traditional literature and poetry. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

188. Special Topics in Native American Literary Studies (4) I, II, III. The Staff
   Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied.

190. Seminar in Native American Studies (2) III. The Staff (Fortes 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. Varese
   Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied.

   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 advisor 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. Rising in charge
   Discussion—1 hour; independent study—3 hours. Prerequisite: senior standing and major in Native American Studies.
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.

187C. Community Tutoring in Native American Studies (1-5) I, II, III. The Staff (Rising in charge) Tutorial—3–15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Rising in charge)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Rising in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Nematology

(College of Agricultural and Environmental Sciences)
Howard Ferris, Ph.D., Chairperson of the Department
Department Office, 488 Hutchinson Hall
(916-752-1403)

Faculty
Edward P. Caswell, Ph.D., Assistant Professor
Howard Ferris, Ph.D., Professor
Scott L. Garner, Ph.D., Assistant Professor
Bruce A. Jaffe, Ph.D., Assistant Professor
Harry K. Kaya, Ph.D., Professor
Benjamin F. Lowe, Ph.D., Professor Emeritus
Armand R. Maggert, Ph.D., Professor
Dewey J. Raski, Ph.D., Professor Emeritus
Becky B. Westerdahl, Ph.D., Lecturer
Valerie M. Williamson, Ph.D., Assistant Professor

Minor Program Requirements:

**Total: 19-20 Units**

- Nematology 110, 110, and Veterinary Microbiology 132
- Two or more courses from one of the following areas: 7-9
  - Botany 120, 121, Entomology 100, 115, 156, 158, Soil Science 111, Zoology 112, 142
  - Plant Science: Microbiology 102, Botany 120, 121, Entomology 100, 115, 156, 158, Soil Science 111, Zoology 112, 142

**Minor Advisor:** C.Y.S. Pang

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 Division section in this catalog for details.

Courses in Nematology

**Upper Division Courses**

100. General Plant Nematology (4) I. Ferris Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A or 1B. An introduction to the classification, morphology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (2) I. Maggert Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to man's environment: Classification, morphology, ecology, distribution, and importance of nematodes occurring in soil and as parasites of plants and animals.

198. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

- 220. Principles and Techniques of Nematode Taxonomy and Morphology (4) I. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of morphologies used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Offered in odd-numbered years.

- 222. Advanced Plant Nematology (3) I. Caswell, Jaffe, Williamson 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 odd-numbered years.

- 225. Nematode Taxonomy and Comparative Morphology (5) I. Maggert 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 nema todes as well as select plant and animal parasites. Offered in even-numbered years.

- 240. Biological Control in Insect and Plant Nematology (2) I. Jaffe, Kaya 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 odd-numbered years.

- 245. Field Nematology (1) I. The Staff Fieldwork—6 days. Prerequisite: courses 100, 222. Six-day demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (SU grading only.)

- 250. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. (SU grading only.)

- 296. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

**Courses in Neurobiology**

**Graduate Courses**

- 200A. Laboratory Methods in Neurobiology (6) I, II, III. The Staff Laboratory—18 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.

- 200B. 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.

- 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 200 (concurrently). Preparation 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.)

**Neurology**

See Medicine, School of

**Neurosurgery**

See Medicine, School of

**Nutrition**

See Nutrition, below; Nutrition (A Graduate Group); and Nutrition Science
Nutrition
(College of Agricultural and Environmental Sciences)
Barbara G. Schneeman, Ph.D., Chairperson of the Department
Department Office, 3135 Meyer Hall (916-752-4630)

Faculty
Kenneth H. Brown, M.D., Professor
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Associate Professor
Louis E. Grivetti, Ph.D., Professor (Nutrition, Geogra-

Eunice Gwynn, Ph.D., Lecturer
Fredric W. Hill, Ph.D., Professor Emeritus
Carl L. Keen, Ph.D., Professor (Nutrition, Internal Medicine)
Bo L. Lonerder, Ph.D., Professor (Nutrition, Internal Medicine)
Roger McDonald, Ph.D., Assistant Professor
Jo Ann Proctor, M.S., Lecturer
Robert B. Rucker, Ph.D., Professor (Nutrition, Biological Chemistry)
Barbara G. Schneeman, Ph.D., Professor (Nutrition, Food Science and Technology, Internal Medicine)
Judith S. Stern, Sc.D., Professor (Nutrition, Internal Medicine)
William C. Weir, Ph.D., Professor Emeritus
Francois J. Zerman, Ph.D., Professor

Related Major Programs. See the majors in Community Nutrition, Dietetics, and Nutrition Science.

Minor Program Requirements:
The Department of Nutrition offers four minor pro-
grams open to students majoring in other disciplines
who wish to complement their study programs with a
concentration in the area of food and nutrition.

Note: If the student 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.............9
Nutrition 118, 119..........................9
Nutrition 120..............................9
Physiology 110............................4
Replacement courses (see note above):

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, 121,
122...........................................11
Food Service Management 123 or Agri-
cultural Economics 112.........................3-4
Replacement courses (see note above):
Nutrition 10, 110, 111, 114, 116A-
116B, Economics 11A-11B.........................9

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..........................................6
Physiology 110............................4
Replacement courses (see note above):
Nutrition 114, 116A-116B, 116AL-
116BL........................................22

Nutrition Science................................20-21
Preparation: plan in advance to include the
required course prerequisites.
Biochemistry 101A-101B or Physiological
Sciences 101A-101B..........................8-7
Physiology 110............................5
Nutrition 110, 111..........................9
Replacement courses (see note above):
Nutrition 114, 115, 116A-116B, 117,
120, 122, 122L, 123, 124, 201, 204.

Minor Adviser: R.B. Rucker

Graduate Study. Programs of study leading to the
M.S. and Ph.D. degrees are available in Nutrition. For
information on graduate study contact the graduate
adviser.

Courses in Nutrition

Lower Division Courses
10. Discoveries and Concepts in Nutrition (3)
II. The Staff
Lecture—3 hours. Nutrition as a science; historical
development of nutrition concepts; properties of
nutrients and foods. Not open to credit to students
who have taken an upper division course in nutrition.

General Education credit. Nature and Environment/Introductory. To receive GE credit, course 11 must be
taken in a concurrent or subsequent quarter.

11. Current Topics and Controversies in Nutrition (2-3)
II. The Staff
Discussion—1-2 hours; oral reports, written
reports, term paper. Prerequisite: course 10 (may be
taken concurrently). Assigned readings and discus-
sion 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 Educa-
tion credit. Nature and Environment/Introductory. To
receive GE credit, course 10 must be taken in a con-
current or previous quarter.

20. Food and Culture: An Introduction to Culture,
Diet, and Cuisine (4)
II. Grivetti
Lecture—3 hours. Discussion—1 hour. Prerequisite:
Anthropology 2, Geography 2, and course 2 recom-
manded. 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/
Introductory

93. Public Issues in Nutrition and Food Science
II. Schneeman, Schweiger (Food Science and Technology)
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 (x students new to the campus. (P/NP
grading only.) (Same course as Food Science and Technology 83.)

99. Individual Study for Undergraduates (1-5)
II. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses
101. Introduction to Nutrition and Metabolism (4)
I. Lonerder
Lecture—4 hours. Prerequisite: Chemistry 8B, Physi-
ology 2 or 110, Introduction to the metabolism of pro-
tein, fat, and carbohydrate; the role of vitamins and
minerals; food utilization. Not open for credit to stu-
dents who have taken courses 110 or 111.

110. Principles of Nutrition (5)
II. Calvert (Animal Science) and Rucker (Nutrition); III. Hung (Animal Science) and Rucker (Nutrition)
Lecture—4 hours. Prerequisite: Physiological Sciences
101B (preferred) or Biochemistry 101B; a course in
physiology or zoology. Fundamental principles of
the nutrition of men and other animals. Physi-
ological basis of nutrient requirements for growth,
maintenance and production. Physiological basis of
nutritional disorders.

111. Human Nutrition (4)
II. McDannel
Lecture—3 hours; discussion—1 hour. Prerequisite:
course 101 or 110. Nutrition of humans; critical study
of nutrient requirements at various phases of life.

112. Nutritional Assessment; Dietary, Anthropo-
morphic, and Clinical Measures (2)
II. Dewey
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 (anthropom-
orphic, physiological methods), and clinical signs of
malnutrition. Principles of validity and reliability
and interpretation of results.

113. Nutritional Assessment; Biochemical Mee-
sures (2)
II. The Staff (McDannel in charge)
Lecture—1 hour; laboratory—2 hours. Prerequisite:
course 111. Variety of biologic markers of human
nutritional status including hematological, urinary,
and hair analyses of clinical importance will be re-
mastered and evaluated. Emphasizes the precision,
accuracy, reliability, 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, pro-
cessing and storage methods on nutritive value of

116A-116B. Diet Therapy (3-4)
II. Zerman, Clifford, Stern
Lecture—3 hours. Prerequisite: course 111; Physio-
ology 110 (or the equivalent). Biochemical and physi-
ological bases for therapeutic diets. Problems in plan-
ning diets for normal and pathologic conditions.

116AL. Practicum in Diet Therapy (2)
II. Zerman
Lecture—1 hour; laboratory—2 hours. Prerequisite:
lengthy written assignments. Prerequisite: course 116A
(may be taken concurrently). Planning and evaluation
of therapeutic diets; procedures in patient education.
Coordinated with course 116A. Deferred grading
only pending completion of 116AL-116BL
sequence.

116BL. Practicum in Diet Therapy (I)
II. The Staff
(Zerman in charge)
Lecture—1 hour; laboratory—1 hour; extensive
written assignments. Prerequisite: course 116B (may
be taken concurrently); course 116AL. Planning and
evaluation of therapeutic diets; procedures in patient
education. Coordinated with course 116B. Deferred
grading only pending completion of 116AL-116BL
sequence.

117. Experimental Nutrition (5)
II. Clifford
Lecture—3 hours; laboratory—2 hours. Prerequisite:
course 111; Biochemistry 101B or Physiological Sci-
ences 101B; a laboratory course in nutrition or bio-
chemistry. Methods of assessing nutritional status.
Application of chemical, microbiological, chromato-
graphic and enzymatic techniques to current prob-
lems in nutrition.

118. Community Nutrition (3)
II. Dewey
Lecture—3 hours. Prerequisite: course 101 or 111;
course 116A recommended. Nutrition problems in
contemporary communities in the U.S. and in deve-
lop countries. Nutrition programs and policy; prin-
ciples of nutrition education.

119. Field Work in Community Nutrition (4)
II. Dewey
Lecture—2 hours; field work—6 hours. Prerequisite:
course 118 and consent of instructor. Introduction to
field work in community nutrition involving nutrition
education, nutrition counseling, or community nutri-
tion research.

120. Food Habits and Their Nutritional Impli-
cations (4)
II. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite:
upper division or graduate standing, upper division

NOTE: For key to footnote symbols, see page 133.
course in nutrition or Biochemistry 101B; course 20 recommended. Advanced themes exploring food habits and nutrition. Topics include: food pyramids, toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories.

122. Ruminant Nutrition and Digestive Physiology (3) I. McCready (Animal Science)
Lecture—3 hours. Prerequisite: Physiology 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B, Microbiology 2 recommended. Study of nutritional utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

122L. Ruminant Nutrition Laboratory (2) II. McCready (Animal Science)
Laboratory—6 hours. Prerequisite: course 122 (concurrent enrollment). Students will conduct experiments in small groups and attend presentations 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. Klausing (Avian Sciences)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110 or 111, Physiological Sciences 101A-101B or Biochemistry 101A-101B; upper division standing in biological or agricultural sciences recommended. Comparative nutrition of non-ruminant animals including domestic animals, wildlife and man. Relationship of nutrition to body composition, feed intake, growth, disease, exercise and stress. Discussion and laboratory exercises on the scientific method for answering questions in nutrition.

124. Nutrition of Fishes and Shellfishes (3) III. Hung (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 commercial finfish cultures.

126. Journalistic Practice in Nutrition (2) III. Stern, Swartenow
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; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. Offered in even-numbered years.

190. Proseminar in Nutrition (1) I, II, III. The Staff (Schneeman in charge)
Seminar—1 hour. Prerequisite: senior standing; consent of instructor. Introduction to nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor. (P/NP grading only.)

190C. Nutrition Research Conference (1) I, 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. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff Laboratory—3-36 hours. Prerequisite: one upper division course in nutrition and consent of instructor. Work experience in one of several practical applications of nutrition, supervised by a faculty member. (P/NP grading only.)

197T. Tutoring in Nutrition (1-2) I, II, III. The Staff Discussion-laboratory—3 or 6 hours. Prerequisite: Nutrition Science majors. Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory exercises, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Schneeman in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Schneeman in charge)
(P/NP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) II. Rucker
Lecture—2 hours. Prerequisite: course 110, Microbiology 101A-101B or Physiological Sciences 101A-101B, Physiology 110. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the chemistry of vitamins and vitamin-like compounds emphasized.

202. Advanced Nutritional Energetics (2) I. Baldwin

203. Advanced Protein and Amino Acid Nutrition (2) III. The Staff (Rogers, Physiological Sciences, in charge), Calvert (Animal Science)
Lecture—2 hours. Prerequisite: course 110, Physiological Sciences 101B, Physiology 110 or the equivalent. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease, and food intake. Study of dietary requirements and interrelationships among amino acids.

204. Mineral Metabolism (2) III. Lonnerdal, Keen
Lecture—2 hours. Prerequisite: course 110, Microbiology 2, Biochemistry 101A-101B or Physiological Sciences 101A-101B, Physiology 110. Studies of metabolic functions and nutritional interrelationships involving minerals.

"212. Design and Evaluation of Nutrition Education Programs (2) I. The Staff (Zeman in charge)
Lecture—2 hours. Prerequisite: graduate standing in nutrition. Skills and techniques of planning and evaluating nutrition programs. Emphasis on nutrition education: curricula, instructional strategies and evaluation methods in formal classroom and informal community settings. Intended for students preparing to administer programs or teach in universities or dietician internships.

216. Advanced Diet Therapy (3) III. Zeman
Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease relationships at cellular and tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

218. Advanced Community Nutrition—Termination (2-12) I, II, III, extra session summer. The Staff (Zeman in charge)
Discussion—1 hour; field work. Prerequisite: courses 118, 119; graduate standing, consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

Lecture—3 hours. Prerequisite: an upper division course in nutrition or consent of instructor; course 118 recommended. Prevalence and etiology of malnutrition worldwide, with emphasis on maternal and child health; evaluation of nutritional and food aid; consideration of the complex relationships between economic development, poverty and nutrition, and options for nutrition policy and planning. Offered in even-numbered years.

252. Nutrition and Development (3) III. Keen
Lecture—3 hours. Prerequisites: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in even-numbered years.

253. Control of Food Intake (3) III. Rogers (Physiological Sciences), Mendel (Animal Science), Stern (Nutrition)
Lecture—2 hours; discussion—1 hour; 2 or 3 laboratories demonstrations per quarter. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in even-numbered years.

254. Applications of Systems Analysis in Nutrition (3) III. Baldwin (Animal Science)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B, or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evaluation of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Offered in odd-numbered years.

255. Natural Toxicants in Foods (2) II. Vohra (Avian Sciences)
Lecture—2 hours. Prerequisite: courses 201, 202, 203. Occurrence, mode of action and alleviation of several natural toxicants in foods and feeds. Offered in odd-numbered years.

256. Nutritional and Hormonal Control of Animal Metabolic Function (3) III. Baldwin (Animal Science), Freedland (Physiological Sciences)
Lecture—3 hours. Prerequisite: courses 201, 202, 203, Physiological Sciences 205A-205B. Significance and interpretation of enzyme, metabolite, in vitro and in vivo isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diachmore interactions in carbohydrate, amino acid, and lipid metabolism will be discussed. Offered in odd-numbered years.

257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2) I. Klausing (Avian Sciences), Calvert (Animal Science)
Lecture—2 hours. Prerequisite: courses 201 through 204, Physiological Sciences 205A-205B or the equivalent. Quantitative and qualitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet-hormone interactions which affect nitrogen metabolism, including protein synthesis, degradation, amino acid synthesis-catabolism, nitrogen transport-excretion, depending on current literature. Offered in odd-numbered years.

290. Beginning Nutrition Seminar (1) I, II. The Staff (Schneeman in charge)
Discussion—2 hours. Prerequisite: consent of instructor. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

290C. Research Conference (1) I, II, III. The Staff (Schneeman in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with the graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (SU grading only.)

291. Advanced Nutrition Seminar (1) I, II, III. The Staff (Schneeman in charge)
Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (SU grading only.)

297T. Supervised Teaching in Nutrition (1-3) I, II, III. The Staff (Schneeman in charge)
Teaching under faculty supervision—3-8 hours. Prerequisite: graduate status in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Schneeman in charge)
Receives (1-12) I, II, III. The Staff (Schneeman in charge)
(SU grading only.)
Professional Course
380, Supervised Teaching in Dietetics (2-12) I, II, III, extra-semester summer. The Staff Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietetics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

Nutrition (A Graduate Group)
R.L. Baldwin, Ph.D., Chairperson of the Group
Group Office, 1151 Meyer Hall (916-752-2512)
Graduate Study. The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For detailed information regarding these programs, address the chairperson of the group.
Graduate Advisers. Consult the Nutrition Graduate Group Office.

Nutrition Science
(College of Agricultural and Environmental Sciences)
The Major Program
The Nutrition Science major provides organized study in nutrition and relevant biological and physical sciences in preparation for (1) graduate study in nutrition, including the nutrition of species or groups, such as human, domestic animal, avian and wildlife; (2) professional study of medicine, veterinary medicine, public health, dietetics; and other health sciences; (3) technical work in nutrition in animal, food, and pharmaceutical industries; (4) technical writing; and (5) health education. You should consult with your adviser with respect to additional courses appropriate to your specific interest.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

Written/Oral Expression

See College requirements

Preparatory Subject Matter

Biological sciences (Biological Sciences 1A, 1B, 1C)..................18
Chemistry (Chemistry 1A-1B-1C-5; and 8A, 8B or 128A-128B and 129A)..................25-27
Computer science (Computer Science Engineering 10 or Agricultural Science and Management 21)..................3
Mathematics (Mathematics 16A-16B)..................6
Physics (Physics 1A-1B)..................6
Statistics (Statistics 13 or Agricultural Science and Management 150)..................4

Breadth/General Education
Satisfaction of General Education requirement plus additional course work in social sciences and humanities

Depth Subject Matter

Biochemistry (Biochemistry 101A-101B) or Physiological Science 101A-101B)..................6
Nutrition 110, 111, 117..................14

Restricted Electives

Biochemistry laboratory (Biochemistry 101L)..................6
Food science..........................6
Physiology with laboratory (Physiology 110, 110L, plus an additional physiology course)..................10
Additional nutrition or related biological and physical sciences..................20

Unrestricted Electives

Total Units for the Degree..................110

Advising Center for the major is located in 1151 Meyer Hall (916-752-2512).
Graduate Study. The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate adviser. See also the Graduate Division section in this catalog.
Graduate Adviser. See Class Schedule and Room Directory.

To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 1 or 3, Psychology 1, Rhetoric and Communication 1, Sociology 1 or 3 or Anthropology 2, Economics 1A or 1B, Food Science and Technology 100A, 100B, 101A, 101B, Nutrition 110, 111, 116A, 116B, 116L-116L, 118, 190. The following courses must be added: Agricultural Economics 112; Food Service Management 120, 120L, 121, 122, 123; Applied Behavioral Sciences 173 or Education 110 or 111. Students intending to apply for admission to a dietetic internship should contact the Advising Office no later than the first quarter of the junior year for information on procedures.

Obstetrics and Gynecology
See Medicine, School of

Ophthalmology
See Medicine, School of

Organizational Studies
See Sociology

Orientation
(College of Agricultural and Environmental Sciences)

Courses in Orientation
Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

Lower Division Course
1. Orientation (no credit) I, II, III. Chavkin (Biochemistry and Biophysics) Discussion exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 133.

Orthopaedic Surgery
See Medicine, School of

Otolaryngology
See Medicine, School of

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, 1126 Haring Hall (916-752-1385)
Faculty
Rick R. Adler, D.V.M., Ph.D., Assistant Adjunct Professor (Pathology, California Primate Research Center)
Mark L. Anderson, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Bradd C. Barr, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Arthur A. Bickford, V.M.D., Ph.D., Assistant Professor (California Veterinary Diagnostic Laboratory)
Patricia C. Blanchard, D.V.M., Ph.D., Assistant Adjunct Professor (California Veterinary Diagnostic Laboratory)
Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus
Donald L. Dungworth, B.V.Sc., Ph.D., Professor
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor
Charles A. Holmgren, D.V.M., Ph.D., Associate Professor
Bill Johnson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Peter C. Kennedy, D.V.M., Ph.D., Professor
Andrew A. Lackner, D.V.M., Ph.D., Assistant Adjunct Professor (Pathology, California Primate Research Center)
Linda J. Lownstine, D.V.M., Ph.D., Associate Professor
N. James McLachlan, B.V.Sc., Ph.D., Associate Professor
Carol U. Meteyer, D.V.M., B.S., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
F. Charles Mohr, D.V.M., Ph.D., Assistant Professor
Peter F. Moore, B.V.Sc., Ph.D., Associate Professor
Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus
Harvey J. O'land, 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.S., B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Courses in Pathology

Upper Division Course
280. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P(NP grading only).

Graduate Courses
281. Animal Disease (3) I. Onder. Lecture—3 hours. Prerequisite: Veterinary Medicine 482, and 451 or 453. Designed for students interested in research and teaching in tropical veterinary medicine. Diseases studied are the most important ones that currently ravage third-world countries, particularly in Africa and Latin America. (SU grading only.) Offered in even-numbered years.

282. Tumor Pathology (3) II. 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 even-numbered years.

285A-285B-285C. Selected Topics in Advanced Special Pathology (3-4-4) I-II-III. The Staff (Dungworth in charge). Lecture—3-4 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary medical student. Patterns of reaction to injury of selected organ systems and differential morphological characteristics of their major disease entities. Emphasis on pathogenetic mechanisms and cellular/subcellular pathology involved in inflammation, pulmonary disease, renal disease, and avian disease. Offered beginning fall quarter of even-numbered years.

287. Comparative Pathology of Laboratory Animals (3) III. Lowenstein. Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor. The pathology of diseases of animals commonly kept in laboratory settings including cold-blooded vertebrates as well as rodents, lagomorphs, and non-human primates. Emphasis will be recognition of lesions and understanding of pathogenesis. Offered in even-numbered 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. (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. Diagnosis and discussion of 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. Primate Pathology Conference (1) I, II, III. Lowest. Lecture—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in primate pathology based on current, available materials. Given jointly by Departments of Pathology in the Medical and Veterinary Schools, and the California Primate Research Center. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff. Group Study of advanced topics in pathology. (SU grading only.)

299. Research in Veterinary Pathology (1-12) I, II, III. The Staff. (SU grading only.)

Pharmacology

Pharmacology, School of

Pharmacology and Toxicology

See Pharmacology and Toxicology (A Graduate Group), below; and Veterinary Pharmacology and Toxicology

Pharmacology and Toxicology (A Graduate Group)

Ph.D., Chairperson of the Group

Group Office, 4111 Meyer Hall (Department of Environmental Toxicology, 916-752-4516)

Faculty. Graduate group members are based in the departments of Environmental Toxicology, Pharmacology, Veterinary Pharmacology and Toxicology, and other laboratories in the Schools of Medicine and Veterinary Medicine, and the College of Agricultural and Environmental Sciences.

Graduate Study. The Graduate Group in Pharmacology and Toxicology offers programs of study and research leading to the M.S. and Ph.D. degrees. For information on the program of study, contact the appropriate graduate advisor (below) or the group chairperson.

Graduate Advisers. C.G. Popper (Veterinary Pharmacology and Toxicology), G.L. Henderson (Pharmacology), B.W. Wilson (Environmental Toxicology).

Courses in Pharmacology and Toxicology

Graduate Courses
201. Principles of Pharmacology and Toxicology (5) I. Miller (Environmental Toxicology). Lecture—3 hours; discussion—1 hour; laboratory—demonstration—3-4 hours. Prerequisite: Biochemistry 1018, Physiology 110. Part one of a three-semester core course sequence. General concepts underlying the metabolic fate and actions of chemicals (drugs and toxicants) in biological systems, including physicochemical properties, dosage response, disposition kinetics, metabolism, mechanisms of chemico-biological interaction, and safety evaluation procedures.

202. Effects of Drugs and Toxicants on Body Systems and Organs (5) II. Buckwell (Veterinary Pharmacology and Toxicology). Lecture—3-4 hours. Discussion—1 hour; laboratory—demonstration—3-4 hours. Prerequisite: satisfactory completion of course 201. Part two of a three-semester core course sequence. Mechanisms of action, pharmacologic and toxic effects, and toxicologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

203. Effects of Drugs and Toxicants on Body Systems and Organs (5) III. Stark (Pharmacology). Lecture—3 hours; discussion—1 hour; laboratory—demonstration—3-4 hours. Prerequisite: courses 201 and 202. Part three of a three-semester core course sequence. Mechanisms of action, pharmacologic, toxic effects, and toxicologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

205. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff. Lecture-discussion-seminar—1 hour each (course format can vary at option of instructor). Prerequisites: courses 201 and consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.

290. Seminar (1) I, II, III. The Staff. Current topics in pharmacology and toxicology. (SU grading only.)

Philosophy

(College of Letters and Science)

Michael V. Wedin, Ph.D., Chairperson of the Department

Department Office, 409 Surge IV (916-752-0607)

Faculty

Roderick Arbini, Ph.D., Associate Professor
William H. Bossart, Ph.D., Professor
Joel A. Friedman, Ph.D., Professor
Neal W. Gilbert, Ph.D., Professor Emeritus
Majorene Greene, Ph.D., Professor Emeritus
James R. Grieveson, Ph.D., Assistant Professor
Jean E. Hampton, Ph.D., Professor
Richard A. Healey, Ph.D., Associate Professor
Michael Jubelirer, Ph.D., Professor
John F. Malcolm, Ph.D., Professor
George J. Mathey II, Ph.D., Associate Professor
Michael V. Wedin, Ph.D., Professor
Richard A. Wolheim, M.A., Visiting Professor

The Major Program

There are almost as many reasons for studying philosophy as there are students. The most common reason, however, is that philosophy examines the kinds of questions that puzzle all thinking people at some time or another in their lives: is everything material? Is human behavior determined, or is free choice possible? Can we justifiably know anything? Are there objective criteria for distinguishing rational from irrational beliefs? Is there a God? Is morality merely a matter of each individual’s feelings, or are there objective principles for deciding what is right or wrong? Thus, the problems studied are of interest to people, regardless of their field.

A second common reason is that thinking critically and precisely about fundamental philosophical issues can be excellent training for the intellectual rigors of any academic subject. Students rightly look on course work in philosophy as helping in the development of intellectual discipline and growth.

A third reason is that the sorts of issues philosophers raise have relevance for most fields. Virtually every
university subject, from history to computer science, poses philosophical problems when fundamental concepts of methods are discussed. The study of philosophy, then, has relevance through the range of university disciplines. The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, and philosophy of science. In addition, upper division course work is given in the fields of philosophy of history, philosophy of mathematics, political philosophy, philosophy of religion, and philosophy of the natural and social sciences.

Philosophy is also a subject in which the problems discussed recur, or have important roots in past discussion. The history of philosophy 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.

Many students become sufficiently interested in major in philosophy, either with a plan to do graduate work or less ambitious, or as a basis for training for other professions. Philosophy majors have done extremely 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 have even been known to go into such fields as architecture and art history.

A.B. Major Requirements:

| UNITs | 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 minor adviser. The range of choice in the logic specialization is limited to the courses listed.

| UNITs | Philosophy—General | 20 | 20 upper division units in philosophy, chosen in consultation with the minor adviser. In special cases, the minor adviser may allow the substitution of lower division units for no more than 4 upper division units. | Philosophy—Logic | 20 | Philosophy 12 or Mathematics 108 .4 | Philosophy 112 | 4 | Select units from Philosophy 131, 132, 133, 134, 135 | 12 |

Minor Adviser: R.A. Arbin.

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 agriculture and engineering might find Philosophy 5 and 10A-G especially useful, since these courses provide practice in concise and logical writing. Science and mathematics students may find these courses 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 and 114A-114B. The offerings at the upper division level of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

Department Activities. The Philosophy department sponsors a lecture-cardinal series of well-known philosophers who present papers in their fields of expertise, usually on Friday afternoons. The History and Philosophy of Science lecture series. The department also operates ongoing faculty and graduate student colloquia. Undergraduate students are encouraged to attend these discussions. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser: M. Jubien.

Courses in Philosophy

Lower Division Courses

1. Introduction to Philosophy (4) I, III, III. The Staff Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of pre-philosophical education credit: Civilization and culture/Introductory.

2. Critical Reasoning (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in science and everyday life. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 8.

3. Critical Reasoning and Writing (4) III. The Staff Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Critical papers emphasized. Not open to students who have completed course 5.

4. AQA Themes in Philosophy (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Basic concepts and techniques of deductive logic with emphasis on propositional logic. Development of a deductive system for propositional logic. Translation of English into symbolic formulas.

5. The Person (4) I. Wolff 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/Introductory.

6. Ethical and Social Problems in Contemporary Society (4) I. The Staff Lecture—3 hours; discussion—1 hour. Philosophical issues and positions involved in contemporary moral and social problems. Among possible topics are: civil disobedience and revolution, racial and sex discrimination, government control, genetic engineering, technology and human values, sexual morality, freedom in society. General education credit: Civilization and culture/Introductory.

7. Historical Introduction to Political Philosophy (4) II. Hamby Lecture—3 hours; discussion—1 hour. Introduction to problems in political philosophy through the reading of classic texts by such philosophers as Plato, Hobbes, Locke, and Marx. Problems to be discussed may include the nature of justice, the right of rebellion, and the defensibility of capitalism. General education credit: Civilization and culture/Introductory.

8. Cosmology and Culture: Interactions between Religion and Science (4) II. Grisemer, Summer. Lecture—hours; discussion—1 hour. Survey of the ways in which religion and science have been in conflict and interaction over time and across cultures. Prerequisites: one lower division course in philosophy or religious studies recommended. Interdisciplinary introduction to major philosophical and scientific controversies. Open to students of all years and majors. Recommended GEP preparation: any Introductory GE course in philosophy or religious studies. (Same course as Religious Studies 18.)


12. Introduction to Ethics (4) II. Hampton Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical theory. Why should we be moral? What is moral behavior? How have social ideas, class bias, and gender roles affected our conception of virtue? General education credit: Civilization and culture/Introductory.

13. Appraising Scientific Reasoning (4) III. Hailey 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/Introductory or Nature and Environment/Introductory.

14. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

15. 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

(Open upper division courses may not be offered every year)

16. Founders of Modern Thought (4) III. The Staff Lecture—discussion—3 hours; term paper. Prerequisite: not open to philosophy majors or students who have received credit for courses 22 or 23. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

17. Metaphysics (4) I. Jubien Lecture—discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Arguments. General education credit: Civilization and culture/Introductory. Recommended GEP preparation: Philosophy 1, 22, or 23.

18. Aesthetics (4) I. Hume Lecture—discussion—4 hours. Prerequisite: one course in philosophy recommended. Philosophical problems of perception and thought, memory and preconception, imagination, truth and error, art and knowledge. General education credit: Civilization and culture/Introductory.

NOTE: For key to footnote symbols, see page 133.
*110. Philosophy of the Social Sciences (4) II. The Staff
Lecture-discussion—4 hours. Prerequisite: one course in philosophy or a social science background recommended. Nature of human action and behavior, analysis of social structures. 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 in social rules.

*110. An Historical Introduction to the Philosophy of Science (4) II. Hailey
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the development of the natural sciences. Impact of these developments on philosophical thought of the immediately following historical period.

*111. Philosophy of Space and Time (4) II. Hailey
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy course. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolutism versus relativism, views of space and time, philosophical impact of relativity theory.

112. Intermediate Logic (4) II. Hailey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or consent of instructor. Development of the full quantifier logic, with identity and descriptions; decision procedures; advanced translation of English into the formal language; elementary theory of classes and relations; Russell's paradox.

114A. History of Ethics (4) I. Arbib
Lecture—3 hours; term paper. Prerequisite: one philosophy course recommended. Introduction to major writings of philosophers on central problems of right conduct: principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

114B. Problems of Ethical Theory and Practice (4) III. Cogov
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Discussion of important problems of ethical theory with application to contemporary moral problems. Examples: relativism, utility and justice, act and rule utilitarianism, concept of a right, justification of punishment, the death penalty, morality of civil disobedience, abortion, war.

116. Philosophy of Law (4) III. Hampton
Lecture—3 hours; term paper. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment.

117. Political Philosophy (4) II. Hampton
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obedience, freedom, and responsibility. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2.

118. Philosophy of History (4) II. The Staff
Lecture-discussion—3 hours; term paper. Survey of philosophical theories of history and an analysis of contemporary problems of historical exploration.

121. Topics in Metaphysics (4) II. Jubien
Lecture-discussion—3 hours; term paper. Prerequisite: course 101. Examination of up to three topics in metaphysics, e.g., fatalism; necessity; identity; ontological categories; minds, bodies, and persons; space and time; freedom and determinism.

122. Topics in Theory of Knowledge (4) II. Mattay
Lecture-discussion—4 hours. Prerequisite: course 102. Examination of one or more topics in theory of knowledge, such as belief, skepticism, justification.

123. Aesthetics (4) II. Wolheim
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to society.

127. Philosophy and Economics (4) III. Hampton
Lecture-discussion—3 hours; term paper. Prerequisite: one upper division course in philosophy. Study of issues as the interaction of economics and moral and political philosophy, e.g., the nature of value, the nature of justice, the nature of rationality, the measurability of human well-being.

131. Philosophy of Logic and Mathematics (4) II. Jubien
Lecture—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of logic and mathematical theories. Selected topics include logical and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theories; philosophy of geometry, philosophical implications of Gödel's incompleteness results.

132. History of Logic (4) II. Friedman
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or logic recommended. Overview of the chief developments in the history of logic.

133. Survey of Advanced Logic (4) III. Friedman
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or consent of instructor. Survey of topics in mathematical logic and axiomatic logic, theory of descriptions, metalogic, models, Tarski's theory of truth, classes and relations, Russell's Paradox, type theory and axiomatic set theory, Gödel's incompleteness theorems, computability and decidability, and nonstandard logics.

134. Modal Logic (4) III. Mattay
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and axiomatic treatments. Applications to epistemology, ethics, and temporal logic.

135. Alternative Logics (4) II. Mattay
Lecture-discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionistic logic, relevance logics and non-monotonic logics. Applications to computer science.

137. Philosophy of Language (4) II. Jubien
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or linguistics. Discussion of problems arising from consideration of the syntax and semantics of natural and formalized languages. Nature of linguistic rules and universals; theories of universal grammar; linguistic implications for theories of cognition.

143. Hellenistic Philosophy (4) II. The Staff
Lecture-discussion—3 hours; term paper. Renaissance conceptions of man, as found in the writings of Valla, Feccio, Pico, Pomponazzi, Eratristus, Vives, and Montaigne. Some reference to current religious and social developments.

151. Philosophy of the Nineteenth Century (4) I. Hampton
Lecture-discussion—4 hours. Prerequisite: courses 21, 22, or 23 recommended. Idealism of Hegel, the pessimism of Schopenhauer, Marxism, the rationality of Kierkegaard, Nietzsche and Dostoevsky General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, 23, History 147A or 147B.

155. American Philosophy (4) I. The Staff
Lecture-discussion—3 hours; term paper. Study of such American thinkers as Emerson, Thoreau, James, Dewey, Santayana, Whitehead, and C.I. Lewis.

156. Contemporary Analytic Philosophy (4) III. The Staff
Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy. Consideration of central issues such as meaning/reference, analytical/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment, possibilist world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen.

158. Phenomenology and Existentialism in Germany (4) II. Bossett
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thinkers such as Husserl, Heidegger, Jaspers.

159. Phenomenology and Existentialism in France (4) III. Bossett
Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century French thinkers such as Sartre, Marit, Merleau-Ponty, Heidegger, Jaspers.

160. Pre-Socratic (4) III. Malcolm
Lecture-discussion—3 hours; term paper. Prerequisite: course 21. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heraclitus, Parmenides, Empedocles, Anaxagoras, and the atomists.

161. Plato (4). Malcolm
Lecture-discussion—3 hours. Prerequisite: course 21.

NOTE: For key to footnote symbols, see page 133.
Physical Education

(Committee of Colleges and Schools)

E. Dean Ryan, Ed.D., Chairperson of the Department
Herbert A. Schmalenberger, M.A., Vice-Chairperson of the Department

Department Office, 204 Dickey Gymnasium
(919) 752-0511

Faculty

William C. Adkins, Ph.D., Professor
Richard L. Bell, Ph.D., Professor (Chemical Engineering)
Edmund M. Bernauer, Ph.D., Professor
G. Robert Biggs, B.A., Associate Supervisor
Bobbie J. Bolen, M.A., Associate Supervisor
Robert R. Brooks, M.A., Supervisor
Joseph E. Carlson, M.A., Supervisor
Gary J. Colberg, M.A., Lecturer
Jennifer Curry, M.A., Supervisor
Kathleen M. DeYoung, B.A., Associate Supervisor
Robert L. Ford, M.A., Supervisor
Bradley M. Franz, B.S., Lecturer
Pamela L. Gillis-Fisher, M.A., Supervisor
Raymond S. Goldsmith, M.A., Supervisor
Kathy A. Hagenstrom, M.S., Lecturer
Jenny W. Hinckley, A.B., Supervisor
Jorja E. Hoehn, M.S., Lecturer
Jeffrey B. Hogan, B.A., Lecturer

2 Robert G. Holley, Ph.D., Associate Supervisor
3 Barbara A. Johnson, M.S., Supervisor
Susan E. Jennings, Ph.D., Lecturer
Charles R. Kovacic, Ed.D., Professor Emeritus
Willard S. Lotter, Ed.D., Senior Lecturer
Paul J. Motta, Associate Professor
Donald G. Morris, B.S., Lecturer
John E. Nelson, M.A., Lecturer
Becky Nyby, B.S., Lecturer

Preparatory Subject Matter: 23-24
Biological Sciences 1A: 5
Chemistry 1A: 5
Physical Education 45: 3
Physics 1A: 3
Psychology 1 or 5: 3-4
Statistics 13: 4

Depth Subject Matter: 47
Human Anatomy 101: 4
Physical Education 101, 102, 103, 104: 16
Psychology 110: 6

Minimum of 12 upper division units in physical education chosen with approval by a major adviser: 12

Biological emphasis: Students electing this emphasis must select a minimum of 9 units from Physical Education 110, 111, 112, 113, 115, 117, or 118.

Psychological emphasis: Students electing this emphasis must select a minimum of 7 units from Physical Education 120, 121, 122, or 125.

Minimum of an upper division physical education unit in either the biological or the psychological area selected with approval by a major adviser: 8

Students are expected to elect the above biological or psychological con-
Minor Program Requirements:

UNITs

Physical Education .............................................................................. 18
At least 18 upper division units in physical education from one of three options.

a. Biomechanics
   1) Physical Education 103 and one course from 101, 102, 104, 105
   2) Minimum of two courses from Physical Education 113, 115, 125
   3) Additional courses to complete a total of 18 upper division units.

b. Exercise Physiology
   1) Physical Education 101, and one course from 102, 103, 104, 105
   2) Minimum of three courses from Physical Education 110, 111, 112, 113
   3) Additional courses to complete a total of 18 upper division units.

c. Psychological Aspects
   1) Physical Education 105, and one course from 101, 102, 103, 104
   2) Minimum of two courses from Physical Education 120, 121, 122, 125
   3) Additional courses to complete a total of 18 upper division units.

Minor Advisers: Same as major advisers.

Teaching Credential Subject Representative, H. A. Schmalenberger. See also the section on the Teacher Education Program.

Graduate Study: A program of study and research leading to the M.A. degree is available in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education. See also the Graduate Division section in this catalog.

Graduate Adviser: W.C. Adams.

Class and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, showers, lockers, tennis courts, and the athletic fields. Certain equipment and games and sports are available for exercise and recreation, either with or without instruction. Lockers will be turned in on the last day of class, i.e., before the final examination period.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

Courses in Physical Education

Lower Division Courses

1. Physical Education for Men and Women (1/2 unit)
   - The Staff (Chairperson in charge)

Laboratory—2 hours. Sections in: a) sports skills, rules and strategy; b) physical fitness and personal health; c) recreation; d) dance, and e) intercollegiate athletics. May be repeated for a total of 6 units. (P/NP grading only)

2. Principles of Basic Exercise Conditioning (2)
   - The Staff (Chairperson in charge)

Laboratory—1 hour, laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches currently in use in exercise conditioning, e.g., theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, and limitations of environment, age, and gender on fitness levels. (P/NP grading only)

3. Foundations of Emergency First Aid Services (2)
   - The Staff (Chairperson in charge)

Lecture—1 hour, laboratory—1 hour. 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.

4. Professional Physical Education Activities: Men and Women (1, 1, III. The Staff (Chairperson in charge)
   Lecture—1 hour; laboratory—2 hours. Fundamental skills for: a) coaching competitive athletics; b) classroom teaching and coaching, and c) classroom teaching and officiating. May be repeated for a total of 6 units.

5. Administration of Intramural Sports (2)
   - The Staff (Chairperson in charge)

Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

6. Theory of Lifesaving and Water Safety (2, 3, II. Hinsdale, Jahn
   Lecture—1 hour; laboratory—2 hours. Prerequisite: course 10; sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development needed to proceed with 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.)

7. Training Course for Water Safety Instructors (3)
   - The Staff (Chairperson in charge)

Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1), or consent of instructor; course 5 and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.)

8. Basic Scuba (2)
   - The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swim test. Introduction to basic knowledge required for scuba diving, function and maintenance of equipment, physics and physiology of diving, first aid and CPR, oceanography and marine life, and underwater communication. Pool and open water sessions available for certification. (P/NP grading only)

35A. Dance Composition (2)
   - The Staff (Chairperson in charge)

Laboratory—6 hours. Prerequisite: course 1, modern jazz or dance techniques, or consent of instructor. Composing phrases of movement with a knowledge of elements involved in the craft of choreography: design, dynamics, rhythm, motivation and gesture, vocabulary.

35B. Dance Composition (2)
   - The Staff (Chairperson in charge)

Laboratory—6 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 props.

35C. Dance Composition (2)
   - The Staff (Chairperson in charge)

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 4-7 minute presentation in a spring concert on stage. Costumes and lighting will be created and correlated for each dance by the choreographer.

36A-36B. History of Dance (3-3)
   - The Staff (Chairperson in charge)

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 Baroque period to the twentieth century.

44. Principles of Healthful Living (2)
   - The Staff (Chairperson in charge)

Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only)

45. Foundations of Physical Education (3)
   - The Staff (Chairperson in charge)

Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological and sociological foundations of physical education.
92. Physical Education Internship (2-5) I, II, III. The Staff (Chairperson in charge)
Laboratory—6 to 15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical 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 once but no internship units will be counted toward Physical Education major. (P/NP grading only)

97T. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutorial—1 to 5 hours. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

100. Field Experience in Teaching Physical Educa-tion (1) I. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only)

101. Physiological Regulation During Exercise (4) L. Bernauer, M. Volchater
Lecture—3 hours; discussion—1 hour alternate weeks with laboratory—3 hours. Prerequisite: Biological Sciences 1A, Physics 1A, Anatomy 101, and Physiology 110. A study of muscle biochemistry, cardiovascular, body fluids, blood, acid base and respiratory metabolic regulations during acute bouts of exercise. Focus on physiological and environmental effects limiting athletic performance and running fatigue. Role of physical activity in maintaining optimal regulatory functions.

102. Physiological Adaptations to Exercise (2) L. Adams
Lecture—2 hours. Prerequisite: course 104 or consent of instructor. Analysis of physiological adaptations to chronic physical activity and selected environmental stresses. (P/NP grading only)

103. Analysis of Human Movement (4) L. K. Williams
Lecture—3 hours; laboratory—3 hours alternate weekly with discussion—1 hour. Prerequisite: Human Anatomy 1A; recommended. Biomechanics of human movement. Analysis of human movement from the perspective of locomotion and exercise. (P/NP grading only)

104. Introduction to Motor Control and Skill Acquisition (3) L. K. Williams, Jennings
Lecture—2 hours; discussion—1 hour alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1 or 15, or course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neuropsychological and behavioral aspects of motor control and performance are examined. Theories of movement retention and motor learning are covered.

105. Psychosocial Factors in Motor Performance (3) L. Ryan
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Survey of the field and experimental findings from social psychology and social motivation and their application to motor performance, including sex
differences, success and failure, anxiety, expectancies, anxiety, competition, and aggression.

106. Exercise Metabolism (3) I. Moli
Lecture—2 hours; laboratory—4 to 6 hours per week. Prerequisite: course 101, 102; Chemistry 1A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations which affect metabolism and performance. Knowledge of metabolic adaptations in laboratories will utilize a variety of techniques to characterize the metabolic responses to exercise.

111. Environmental Effects on Physical Perform-ance (3) L. Bernauer, Adams
Lecture—2 hours; laboratory—3 hours; discussion—1 hour alternate weeks. Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological functions and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations will be studied.

112. Clinical Exercise Physiology (4) L. Moli, Holly
Lecture—3 hours; laboratory—3 hours; discussion—1 hour alternate weeks with laboratory—3 hours. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning on disease are covered.

113. Growth and Development in Human Perform-ance (3) I. Moli, Adams
Lecture—3 hours. Prerequisite: Biological Sciences 1A, Human Anatomy 101, and Physiology 110. Developmental and genetic effects on the human body. 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) L. K. Williams
Lecture—2 hours; laboratory—3 hours alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion.

117. Exercise and Aging in Health and Disease (3) L. Moli, Holly
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) or 113 (concurrent). Exercise and rehabilitation therapies for various diseases associated with aging (e.g., cardiovascular, pulmonary and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality.

118. Physical Fitness in the Workplace (3) I. Bernauer
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 remuneration.

120. Sports in American Society (4) I. Gill
Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, leisure, recreation, and education; current trends and problems.

121. Sports Psychology (4) L. Ryan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings, and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and field data.

122. Psychological Effects of Physical Activity (3) L. Jennings
Lecture—3 hours. Prerequisite: Psychology 1 or 15, and consent of instructor. 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) L. K. Williams, Jennings
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms of open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences.

128A. Research Diving: 65 Feet (5) I. L. Bell, Morris
Lecture—1 hour; laboratory—1/2 hour. Prerequisite: basic Scuba Certification from approved agency (course 29 or the equivalent); 10 logged open-water dives since certification; consent of instructor. Lecture in diver rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving, pool and open water certification (contact Department of Office for details). (P/NP grading only)

128B. Research Diving: 65 Feet (5) II. L. Bell, Morris
Lecture—1 hour; laboratory—1/2 hour. Prerequisite: course 128A; consent of instructor. Lecture in diver rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving, pool and open water sessions available for certification (contact Department of Office for details). (P/NP grading only)

131. Physical Education for the Handicapped (4) L. Vochetzer
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 Manage-ment (3) I, II, III. Pappas
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety in first aid programs in school and community sports, recreation and all types of group activities. The study and practice of first aid leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

133. Prevention and Care of Sports Injuries (3) I, II, III. Pappas
Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Human Anatomy 101 (may be taken concurrently). Management of the prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory orientation, anatomy and physiology, physical therapy methods, and taping techniques.

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (4) I. The Staff (Chairperson in charge)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 133, Human Anatomy 101, and consent of instructor. Advanced study of athletic injuries, their evaluation and management, with laboratory work in biomechanics and pathophysiology. Active study of selected current topics in athletic training.

140. Principles and Theory of Physical Education (4) L. Piper, Schlakenberger
Lecture—4 hours. Prerequisite: course 45 or consent of instructor. Critical assessment of selected underlying physical education programs.

NOTE: For key to footnote symbols, see page 133.
142. Physical Education in the Public Schools (3) S. Schrinderger, P. 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 of general principles of management and administration to athletic coaching in high school. (PINP grading only)

143B. Coaching Effectiveness (2) I. Singleton
Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administration to athletic coaching in high school. (PINP grading only)

144. Principles of Health Education (2) I, III. Lotter
Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools. (PINP grading only)

145. Administration of Health/Fitness Programs (2) II.
Lecture—2 hours. Principles of organizing and directing health/fitness programs, includes selection and training of personnel, methods of evaluating personnel and budgeting elements of planning.

146. Theory and Practice of Exercise Training (1) I, II, III. H. Jennings
Lecture-discussion—1 hour. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programs, exercise techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. (PINP grading only)

146L. Shape-Up Testing and Training Laboratory (1) I, II. H. Jennings
Lecture—3 hours. Prerequisite: course 146 (may be taken concurrently). Primary involvement in leading shape-up classes and attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (PINP grading only)

147. Adult Fitness Testing Laboratory (1) I, II, III. H. Jennings
Lecture—3 hours. Prerequisite: courses 146, 146L, and 102 (may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, and assisting with physiological testing sessions. (PINP grading only)

148. Theory and Practice of Exercise Testing (1) I, II. H. Holl
Lecture-discussion—1 hour. Prerequisite: courses 101, 102, 112 (may be taken concurrently). Instruct and practice exercise testing with older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (PINP grading only)

148L. Adult Fitness Testing Laboratory (1) I, II, III. H. Holl
Lecture—3 hours. Prerequisite: courses 146, 148 (concurrently); current CPR. Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. (PINP grading only)

149. Cardiopulmonary Rehabilitation Laboratory (3) I, II, III. H. Holl
Lecture—3 hours. Prerequisite: courses 146 and 148L; current CPR certification. Testing and training of cardiac and breathing 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. (PINP grading only)

150. Recreation in the Community (3) I. Jahn
Lecture—2 hours; discussion—1 hour; two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

192. Physical Education Internship (2-12) I, II, III. The Staff (Chairperson in charge)
Lecture—6-38 1/2 units. Work-experience training 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. (BU grading only)

197T. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutor—1-5 hours. Prerequisite: consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. (PINP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (PINP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Department Chairperson. (PIN grading only)

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Molé, Bernauer
Lecture—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, III. Bernauer, Molé
Lecture—1 hour; seminar—1 hour. Prerequisite: course 200A. A methodological approach to problemsolving, processes in research design and analysis; written and oral presentation of a thesis proposal.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) Bernauer
Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Sports nutrition, taping, and use of physical modalities will be discussed. (Same course as: Physical Medicine and Rehabilitation 201A)

220. Research Topics in Biomechanics (3) III. K. Williams
Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing; course 115 recommended. Survey of current research across diverse areas in biomechanics of human movement. Topics include locomotion, sport biomechanics, electromyography, musculoskeletal and tissue mechanics, advances in measurement technology, and clinical biomechanics. Offered in even-numbered years.

221. Anthropometry in Physical Activity (3) Adams
Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: consent of instructor. Study of physical characteristics of body proportions, and body composition in men as they affects physical performance, and of body structural and compositional changes accompanying exercise and systematic physical conditioning. Offered in odd-numbered years.

222. Metabolic Functions in Exercise (3) I. Molé
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102, Physiology 114. Review of the current 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.

223. Physiological Basis of Physical Fitness (2) I. Bernet
Lecture—1 hour; seminar—2 hours. Prerequisite: course 112 or consent of instructor. Physiological bases and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as is the predictive significance of normal and abnormal ECGs.

224. Exercise Electrocardiography (2) I. Holy
Lecture—2 hours. Prerequisite: course 112 or consent of instructor. Theoretical and practical aspects of exercise electrocardiography (ECG) are presented with emphasis on clinical applications to cardiology. Examination of current discussion of current research topics associated with the physiological aspects of physical activity and exercise training, and adaptation. Offered in even-numbered years.

225. Seminar in Cardiac Rehabilitation (2) II, III. Holy
Lecture—2 hours. Prerequisite: course 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on prevention and treatment through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation will be explored.

226. Measurement of the Biological Aspects of Human Performance (3) I. The Staff (Holy in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 112; consent of instructor. Application of measurement methods to the study of human performance. Emphasis placed on the critical selection of the most valid test and obtaining the most accurate and reliable results.

227. Research Techniques in Biomechanics (3) I, III. K. Williams
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 112 or consent of instructor. Course 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, platform analysis, strength assessment, planar and three-dimensional cinematography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as: Biomedical Engineering 227)

230. Human Performance: Psychological Aspects (3) I. Ryan
Lecture—2 hours; seminar—1 hour. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport.

232. Health Psychology: Effects of Physical Activity (3) I. Jennings
Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health.

290. Seminar in Physical Education (1) I. II. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing; required of all first year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in physical education. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of instructor. (SU grading only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of instructor. (SU grading only)

Professional Courses

300. The Elementary Physical Education Program (3) I. Schmiedinger, Goldbar
Lecture—1 hour; laboratory—2 hours; field trips to

NOTE: For key to footnote symbols, see page 133.
selected programs. Prerequisite: senior standing or credit student. Introduction to principles, theories, material, and practices of elementary school physical education program.

360. Methods of Teaching Physical Education (3) III. Schmallenberger, Gologbar 
Lecture—3 hours; laboratory—6 hours. Prerequisites: course 142 and six units of course 7; or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only)

Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science) 
Robert N. Shetton, Ph.D., Chairperson of the Department
Wendell H. Potter, Ph.D., Vice Chairperson of the Department
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Franklin P. Brady, Ph.D., Professor
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Vincent T. Colangelo, Ph.D., Associate Professor
Linton K. Corruggi, Ph.D., Professor
James E. Draper, Ph.D., Professor
Glen W. Erickson, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
Claude Garrod, Ph.D., Professor
Kenneth R. Greider, Ph.D., Professor Emeritus
John F. Gunion, Ph.D., Professor
James P. Hurley, Ph.D., Professor Emeritus
John A. Jungmann, Ph.D., Professor
Joseph D. Knapp, Ph.D., Professor
William J. Knox, Ph.D., Professor Emeritus
Winston T. Ko, Ph.D., Professor
Richard L. Lander, Ph.D., Professor
Douglas M. McCrum, Ph.D., Associate Professor
Neal Peck, Ph.D., Senior Lecturer
David E. Peck, Ph.D., Professor
Wendell H. Potter, Ph.D., Associate Professor
Roderick V. Reid, J.D., Ph.D., Associate Professor
Richard T. Scaletti, Ph.D., Assistant Professor
Robert N. Shetton, Ph.D., Professor
Rajiv R.P. Singh, Ph.D., Assistant Professor
William W. True, Ph.D., Professor
David J. Webb, Ph.D., Assistant Professor
Philip M. Yager, Ph.D., Professor
Kangfong Zhu, Ph.D., Assistant Professor
Georgy Zimin, Ph.D., Assistant Professor

The Program of Study

While many people think of physics as levers and pulleys or space shots and atomic reactors, there is much more to the realm of physics. From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. For example, the workings of the airplane, the paint sprayer, and the pitcher’s curve ball are all understood in terms of the same physical law. Information learned from high-energy particle accelerators and nuclear reactions teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

As the world becomes more and more complex, the sciences appear to become more difficult to understand. With the explosion of science, many of the complex phenomena and devices are easily understood and used by those with a good understanding of the basic principles of physics. A major in Physics or an Applied Physics at UC Davis will provide a student with this basic knowledge, plus experience in using that knowledge, to get the most out of today’s technical world.

Careers in physics and Applied Physics. The science of physics involves the observation of natural phenomena and events. From these observations come the mathematical formulation of general principles which either describe or explain specific problems. Because physics is so basic to other sciences, its study provides a background with broad flexibility for later activities.

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 either physics or applied physics provides an excellent foundation for graduate work in physics. EUC physics graduates are regularly admitted to the best graduate schools in the country. These majors also provide 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, materials science and energy.

The Major Programs

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 broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied area of physics. 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.

All three are developed in a highly sequential manner, i.e., Physics 9A-9B-9C-9D and Mathematics 21A-21B-21C and 22A-22B-22C are required for most upper division courses and must be taken in the freshman and sophomore years. Some Applied Physics concentrations have additional recommended lower division courses.

In the freshman year, Astronomy 2 is recommended for the student who wishes to take a class in this department prior to enrolling in Physics 9 in the Spring Quarter. Honors mathematics is highly recommended for both the freshman and sophomore years.

Students who have completed a high school course in differential and integral calculus can finish the Physics 9 sequence during the freshman year and begin upper division physics courses in the sophomore year by taking Physics 9A in the first summer session prior to entering the University in the fall. This gives these students extra time in the junior and senior years to be used, for example, to complete a double major, to undertake interdisciplinary studies, to participate in research, or to take graduate courses in physics.

In the junior year the student normally studies mathematical methods, analytical mechanics, electricity and magnetism, and begins quantum mechanics. In the senior year the study of quantum mechanics is continued and courses in the principal modern fields of physics are selected. Laboratory courses may be taken both years. All specifically listed physics courses are required; either a bachelor’s degree in physics should be taken for a letter grade.

Applied Physics

B.S. Major Requirements:

Preparatory Subject Matter
Physics 9A, 9B, 9C, 9D .................. 16
Engineering 5 (or equivalent programming course) .................. 3
Chemistry 1A-1B or 4A-4B .................. 15
Any recommended courses for a particular concentration

Depth Subject Matter (Common Core) .................. 54
At least 18 units from approved courses within one of the following concentrations:

(a) materials science, physical electronics, quantum optics, condensed matter nuclear physics, chemical physics, astrophysical physics, geophysics, physical oceanography. (Lists of approved courses in each of the upper division physics representative programs are available from the Physics Department.)

Total Units for the Major .................. 109

Physics

A.B. Major Requirements:

Preparatory Subject Matter
Physics 9A, 9B, 9C, 9D .................. 16
Engineering 5 (or equivalent programming course) .................. 3

Depth Subject Matter
At least 4 additional upper division units in physics .................. 4

Total Units for the Major .................. 79

Recommended
Chemistry 1A-1B or 4A-4B-4C. See also recommended elective courses following the B.S. program below.

Physics

B.S. Major Requirements:

Preparatory Subject Matter
Physics 9A, 9B, 9C, 9D .................. 16
Engineering 5 (or equivalent programming course) .................. 3
Chemistry 1A-1B-1C or 4A-4B-4C .................. 15

Depth Subject Matter
At least 10 additional upper division units from physics. (No more than 6 units in courses numbered 194H, 195, 196, and

NOTE: For key to footnote symbols, see page 133.
5B. Electricity and magnetism, modern physics. Students who have had course 6B or 9C (former 8B) may not receive credit for course 5C. Those who have had course 1B may receive only three units of credit. (Former course 6B.) (CAN Phys Seq A)

6A. General Physics
This course has been replaced by course 5A.

6B. General Physics
This course has been replaced by course 5C.

6C. General Physics (4) I.
Prerequisite: course 6B. Continuation of courses 6A-6B. Effective spring 1991 replaced by course 5B.

8A. Classical Physics
This course has been replaced by course 9A.

8B. Classical Physics
This course has been replaced by course 9C.

8C. Classical Physics
This course has been replaced by course 9B.

8D. Classical Physics
This course has been replaced by course 9D.

9A. Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only one unit of credit allowed for students who have completed course 1A. Only one unit of credit allowed for students who have completed course 5A (former 6A). (Former course 8A.) (CAN Phys B)

9B. Classical Physics (4) I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9A (former 8A) or 5A (former 6A) with consent of instructor. Mechanics 21C; Mathematics 22C (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Not open for credit to students who have completed course 10A. Only one unit of credit allowed to those who have completed course 5B (former 6C). (Former course 8C.) (CAN Phys 10)

9C. Classical Physics (4) II. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9B (former 8C); Mathematics 223S (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell's equations. Only one unit allowed to those who have completed course 5C (former 6B). (Former course 8S.) (CAN Phys 12)

9D. Modern Physics (4) III. The Staff
Lecture—3 hours; discussion—2 hours. Prerequisite: course 9C and Mathematics 22B; Mathematics 22A recommended (may be taken concurrently). Introduction to physics since 1900. Special relativity, quantum mechanics, atomic structure, condensed matter, nuclei, particle physics. Only one unit of credit allowed to students who have completed course 5C (former 6C). (Former course 9D)

10. Basic Concepts of Physics (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of basic principles: motion, gravitation, electricity and magnetism, light, relativity, waves, quanta, nuclei, elementary particles. Includes lectures demonstrations and elementary problem solving. Check with the department office for the enrollment (history/philosophy/energy/environment, natural phenomena, etc.) each quarter. Students who have had any other physics course (except 137, 160) will not receive credit for course 10A, 10B. General Education credit: Nature and Environment/Introductory.

98. Directed Group Study (1-5) I, II. 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. The Staff
(Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)
Upper Division Courses

105A-105B. Introduction to Methods of Mathematical Physics
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. 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. Prerequisite: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.

105AL. Computational Laboratory in Mechanics (1) I, II. Ko Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the application of computers to solving physics problems. Introduction to numerical and graphical methods in mechanics.

105BL. Computational Laboratory in Mechanics (1) I, II. Ko Laboratory—3 hours. Prerequisite: course 105AL; course 105B concurrently. Computer application of numerical and graphical methods in mechanics.

106L. Continuum Mechanics (3) III. Vagner Lecture—3 hours. Prerequisite: courses 104B, 105A. Continuum mechanics.

108. Optics (3) III. Cahill Lecture—3 hours. Prerequisite: course 9 or 5 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.

108L. Optics Laboratory (1) III. Cahill Laboratory—3 hours. Prerequisite: course 108 concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.

110A-110B-110C. Electricity and Magnetism (3-3-3) I-II-III. True Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D. Mathematics 22A, 22B, 22C passed with a grade of C- or better, or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Physics (3-3) III. Corruccini Lecture—3 hours. Prerequisite: courses 9A, 9B, 9C, Mathematics 22C, and course 105B or 115A or the equivalent. Introduction to statistical mechanics and thermodynamics.

115A-115B. Introduction to Quantum Mechanics (3-3) III-IV. Jungenger Lecture—3 hours. Prerequisite: courses 104B and 105B passed with grade of C- or better, or consent of chairperson. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic and molecular physics.

116A. Electronic Instrumentation (4) II. Pellet Lecture—3 hours. Laboratory—3 hours. Prerequisite: course 9C, Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) III. Potter Lecture—3 hours. Laboratory—3 hours. Prerequisite: courses 9D, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers (IBM or compatible) in physics.

121. Foundations of Atomic and Molecular Physics (4) III. McColm Lecture—3 hours. Outside work—9 hours. Prerequisite: course 9D. Mathematics 21C. The phenomena of atomic and molecular physics; introduction to quantum mechanics and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state.

122A. Advanced Physics Laboratory: Atomic/Solid-State (3) I, II. Corruccini Laboratory—6 hours. Prerequisite: course 9D. Experimental techniques and measurements in atomic and solid-state physics; e.g., spectroscopy, optical pumping, magnetic resonance, superconductivity, semiconductor solid-state techniques. The student performs three to six experiments depending on difficulty. Individual work is stressed.

122B. Advanced Physics Laboratory: Nuclear/Particle Physics (1) I, II. Pellet Laboratory—8 hours. Prerequisite: course 9D. Similar to class 122A with experiments in gamma-ray coincidence, Mössbauer Effect, Rutherford scattering, 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.

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) I. Knox Lecture—3 hours; outside work—6 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

130A-130B. Elementary Particle Physics (3-4) II-III. Lander Lecture—3 hours; term paper required for 130B. Prerequisite: course 115A. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electroweak, and weak interactions. Introduction to Feynman calculus.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungenger, 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 nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10. (Same course as Applied Science Engineering 137.)

140A. Introduction to Solid-State Physics (3) II. Webb Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of experimental phenomena in solids. Crystal structure, phonons, simple metals.

140B. Introduction to Solid-State Physics (4) III. Webb Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. Discussion of the following: energy bands and Fermi surfaces, transport phenomena, semiconductors, ferromagnetism, magnetic resonance.

153. Introduction to Heat Transfer (2) II. McCollom Lecture—1 hour; outside readings and extensive problem sets. Prerequisite: courses 104A-104B, 105A-105B, 115A; 122A (may be taken concurrently). Fundamentals of conduction, convection and radiative heat transfer with an emphasis on the solution of practical problems involving the combined modes of conduction and convection. Viscous fluid dynamics pertinent to convective heat transfer.

160. Environmental Physics and Society (3) I. Jungenger Lecture—3 hours. Prerequisite: course 9D or 5C; or course 10 and 18 and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Evironment 160.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

196. Special Study for Honors Students (4) I, II, III. The Staff (Chairperson in charge) Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

196. Senior Thesis (I, II, III. The Staff (Chairperson in charge) Prerequisite: physics major or senior standing. Preparation of a senior thesis on a topic selected by the student in consultation with his advisor. May be repeated for a total of 16 units and for no more than 5 units in any one quarter without Departmental approval.

197. Tutoring in Physics and Astronomy (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Graduate Courses

200A. Theory of Mechanics and Electromagnetics (3) I. Vagner Lecture—3 hours. Prerequisites: courses 104B, 105B, and 110C or the equivalent; course 204A (concurrently). Special theory of relativity, covariant formulation of mechanics and electromagnetic theory, Lagrange's equations, variational principles, discrete and continuous mechanical and electromagnetic systems.

200B. Theory of Mechanics and Electromagnetics (3) II. Vagner Lecture—3 hours. Prerequisites: course 200A; course 204B (concurrently). Hamilton's equations. Hamilton-Jacobi theory and contact transformations, action-angle variables and perturbation theory, selected topics in mechanics, variational principles; compressible and incompressible flows, gravity waves and shock theory.

200C. Theory of Mechanics and Electromagnetics (3) III. Hurley Lecture—3 hours. Prerequisite: course 200B. Brief review of static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics.

200D. Theory of Mechanics and Electromagnetics (3) I. Hurley Lecture—3 hours. Prerequisite: course 200C. Diffraction theory. Radiating systems and electron theory.

204A-204B. Methods of Mathematical Physics (3-3) I-II. Eckerson Lecture—3 hours. 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. Quantum Mechanics (3) I. Chau Lecture—3 hours. Prerequisite: course 115B. Nonrelativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and the use of state vectors in describing a dynamical system.

215B. Quantum Mechanics (3) II. Reid Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and a discussion of the behavior of the principal quantum number.
215C. Quantum Mechanics (3) III. Reid
Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation.

219A. Statistical Mechanics (3) I. Garrod
Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics.

219B. Statistical Mechanics (3) II. Garrod
Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state.

221. Atomic Physics (3) III. McColm
Lecture—3 hours; seminar—1-2 hours. Prerequisite: course 216A-216B. Term structure of atoms in 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.

223. Group-Theoretical Methods of Physics (3) III. Kiskis
Lecture—3 hours. Prerequisites: courses 215A-215B-215C or consent of instructor. Theory of groups and their representations with applications in selected areas of physics.

224A. Nuclear Physics (3) II. Draper
Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nuclear-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics.

224B. Nuclear Physics (3) II. Draper
Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. 

224C. Nuclear Physics (3) II. Draper
Lecture—3 hours. Prerequisite: course 224A. Study of nuclear scattering and reactions including the optical model and direct reactions. 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) III. Brady
Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Not offered every year.

230A. Quantum Theory of Fields (3) I. Gunion
Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles, techniques and applications of second quantization; Feynman diagrams; renormalization.

230B. Quantum Theory of Fields (3) II. Gunion
Lecture—3 hours. Prerequisite: course 300A. Continuation of 300A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

239A. Quantum Many-Body Systems (3) I. Garrod
Lecture—3 hours. Prerequisite: courses 215C and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter. Not offered every year.

239B. Quantum Many-Body Systems (3) II. Garrod
Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-particle systems. Band theory of solids, electron-phonon interactions, and other topics. Not offered every year.

240A-240B-240C. Solid-State Physics (5-3-3) II-III-I.
Lecture—3 hours. Prerequisite: courses 215A-215B-215C and 140A. One electron model of solids; transport properties; optical properties; properties of lattice waves; electron-phonon interaction; superconductivity; magnetism; non-crystalline solids.

245A. High Energy Physics (3) II. Pellet
Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; disintegrative scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.

245B. High-Energy Physics (3) III. Ko
Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of SU(2) x U(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations.

245C. High-Energy Physics (3) III. Gunion
Lecture—3 hours. Prerequisite: course 245A. Strong interaction; quark chromodynamics phenomenology; jets and other experimental tests; quark and gluon distribution functions; quark and gluon scattering; applications of the renormalization group. Not offered every year.

250. Special Topics in Physics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit. Not offered every quarter.

251. Special Topics in Applied Physics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit. Not offered every quarter.

252A. Techniques of Experimental Physics (3) III. Potter
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter will be used. Pre-NVC.

252B. Techniques of Experimental Physics (3) III. Lander
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. (SU/G grading only.)

291. Seminar in Nuclear Physics (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. (SU/G grading only.)

292. Seminar in Elementary Particle Physics (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Intensive graduate standing in Physics. Presentation and discussion of any topic of current research interest in experimental or theoretical particle physics. Topics vary weekly. (SU/G grading only.)

293. Seminar in Solid-State Physics (1-2) I, II, III. Fong, Potter
Seminar—1-2 hours. (SU/G grading only.)

294. Seminar in Applied Physics (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours. Presentation and discussion of current topics in applied physics by visiting lecturers, staff, and students. (SU/G grading only.)

295. Introduction to Departmental Research (1) I. The Staff (Chairperson in charge)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (SU/G grading only.)

279. Techniques of Teaching Physics (3) III. Geider
Prerequisite: consent of instructor and Department Chairperson. Study of devices and methods used to teach physics at the college level. Participation in preparing lectures and demonstrations in undergraduate classes. Preparation of new material for lectures and laboratories. (SU/G grading only.)

296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU/G grading only.)

Physiological Sciences

(School of Veterinary Medicine)

Richard A. Freedland, Chairperson of the Department

Department Office, 1094 Haring Hall (916-752-1373)

Faculty

Arthur L. Black, Ph.D., Professor
Michael L. Bruss, D.V.M., Ph.D., Associate Professor
Victor W. Burns, Ph.D., Professor Emeritus
Charles E. Cornellius, D.V.M., Ph.D., Professor
Donald L. Curry, Ph.D., Professor
Richard A. Freedland, Ph.D., Professor
Robert J. Hansen, Ph.D., Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
Alfred A. Heusser, Docteur-ès-Sciences, Professor
James H. Jones, Ph.D., D.V.M., Assistant Professor
James G. Morris, Ph.D., Professor
Stuart A. Peeples, M.D., Professor Emeritus
Quinton R. Rogers, Ph.D., Professor

Courses in Physiological Sciences

Upper Division Courses

101A-101B. Physiological Chemistry (4-3) I-II.

Hansen
Lecture—4-3 hours. Prerequisite: organic chemistry. Recommended: a course in physiology (may be taken concurrently) and quantitative analysis. Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions. Biochemistry of the endocrine glands and other specialized tissues and body fluids; chemistry of respiration, energy metabolism and nutrition.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NPr grading only.)

Graduate Courses

205A. Interdisciplinary Metabolism of Animals (4) I.
Freedland, Baldwin (Animal Science); Schnieeman (Nutrition)
Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor: a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates. Offered in even-numbered years.

205B. Interdisciplinary Metabolism of Animals (3) II.
Rogers, Hansen, Hershley (Biological Chemistry), Rucker (Nutrition)
Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids,
proteins, nucleic acids and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in odd-numbered years.

220. Physiology of the Liver (3) Bruss, Cornellus Lecture—2 hours; laboratory—1.5 hours. Prerequisite: systemic 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. Offered in odd-numbered years.

230. The Secretory Process (2) I. Curry Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and intracellular events involved in secretion with emphasis on physiological inhibitors and modifiers. All secretory systems, but emphasis on the beta cell of the endocrine pancreas as role model. Offered in odd-numbered years.

238. Behavioral Adaptations to Parasites and Pathogens (3) I. Hart Lecture—3 hours. Prerequisite: 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 invertebrates, especially wild and domestic mammals. Offered in even-numbered years.

243A-243B, Use of Isotopes as Tracers in Biological Research (2-2-1) Bruss Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or consent of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems.

243L. Laboratory in Use of Isotopes as Tracers in Biological Research (2) Bruss Laboratory—6 hours. Prerequisite: course 243A-243B (concurrently). Study of radioisotope properties, uses, and measurement methods relevant to the biological sciences.

260. Comparative Bioenergetics (4) I. Heusner Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 107A. Fundamentals of thermodynamics and their application in physiology: entropy, probability, information, and thermodynamic potentials. Theory of biological similarity; dimensional analysis, poikilothermy, heterothermy, homeothermy, and biological time. Offered in odd-numbered years.

266. Advanced Respiratory Physiology (4) I. Jones Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student status or consent of instructor. Advanced study of the physiology of the respiratory system with emphasis on principles of ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. Offered in even-numbered years.

270. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour.

278. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only)

Professional Course

397T. Tutoring in Physiological Sciences (1-5) I, II, III. The Staff Prerequisite: graduate or professional student standing in capacity of instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. (SU grading only)

Physiology

See Animal Physiology; Human Physiology (School of Medicine); Physiology (below); and Plant Physiology

Physiology

(College of Agricultural and Environmental Sciences)

Faculty

See under Departments of Animal Physiology, Animal Science, and Avian Sciences.

The Major Program

The physiology major is designed to provide an understanding of the vital functions of living organisms and includes a systematic study of the functional properties of tissues and organs and comparison of processes among different kinds of animals. It will provide the foundation for a challenging career in physiology and also serve 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.

Choice of College

The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and the College of Letters and Science. Students majoring in Physiology 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 material as upper division courses in the subject at UC Davis.

B.S. Major Requirements:

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<th>Category</th>
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<tr>
<td>PREPARATORY SUBJECT MATTER</td>
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<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
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<tr>
<td>Chemistry 1A, 1B, 1C</td>
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<td>Physics 1A, 1B, 1C</td>
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<td>Biology 100, 106B, 106C, 106D</td>
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<td>Chemistry 111A, 111B, 111C</td>
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<td>PHYSIOLOGY DEGREE REQUIREMENTS</td>
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<td>Physiology 100A, 106B, 106C</td>
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<td>Physiology 110, 110L</td>
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<td>Physiology 111A, 111B, 111C</td>
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<td>ADDITIONAL PHYSIOLOGY REQUIREMENTS</td>
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<td>Courses 106A, 106B, 190, 190C, 190D</td>
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<td>Courses 106A, 106B, 106C, 106D</td>
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NOTE: For key to footnote symbols, see page 133.

Courses 106A, 106B, 190, 190C, 190D may not be used for restricted electives.

Breadth Subject Matter

Refer to appropriate College section for a description of requirements to be completed in addition to those for the major.

Total Units for the Major: 104-111

Master Adviser: E.E. Carstens.

Advising Center: 196 Briggs Hall (916-733-9966)

Graduate Study: The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information about admission and other graduate study may be obtained by writing the Graduate Adviser, Department of Animal Physiology. See also the Graduate Division section in this catalog.

Courses in Physiology

Lower Division Courses

*2. Introductory Physiology (4) III. The Staff Lecture—4 hours. Prerequisite: Biological Sciences 1A. Physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

*2L. Introductory Physiology Laboratory (2) III. The Staff Laboratory—6 hours. Prerequisite: course 2 (completed or in progress).

*10. Elementary Physiology (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biological Sciences 1A. Introductory course in physiology for non-science majors.

Upper Division Courses

100A. General Physiology (3) I. Horwitz Lecture—3 hours. Prerequisite: Biological Sciences 1A and Chemistry 8B. Interaction of intracellular compartments in the functioning of the animal cells. The metabolic basis and regulation of cellular function. Relation of cell and tissue structure to physiological mechanisms.

100B. General Physiology (3) II. Papone Lecture—3 hours. Prerequisite: course 100A; 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 function.

100L. General Physiology Laboratory (2) I. Horwitz, Horowitz Discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: course 100A; course 100B (concurrently); or consent of instructor. Experiments in the physical and chemical processes of cells and tissue.

108A. Experiments in Physiology: Design and Execution (3) I. The Staff (banker in charge) Discussion—total of 6 hours; laboratory—7-8 hours. Prerequisite: course 100A, 100B, 100L; consent of instructor. Allows students to experimentally examine current physiological problems. Following group discussions on approaches to designing experiments, groups of 2-3 students will choose a project and design an experimental protocol that they will then carry out and report upon. (P/NP grading only.)

108B. Experiments in Physiology: Design and Execution (3) II. The Staff (banker in charge) Discussion—two 2-hour meetings during quarter; laboratory—9 hours. Prerequisite: course 106A and consent of instructor. Continuation of course 106A. (P/NP grading only.)

110. Systemic Physiology (5) I, II, III. Barkley, Fuller, Ishida, Sillman, Weidner Lecture—5 hours. Prerequisite: Biological Sciences 1A; Physics 18 or 5C recommended. Organ systems. Concepts and principles of integrative and homeostatic mechanisms.
110L. Systemic Physiology Laboratory (2) I. Ishid-
id, III. Adamson
Discussion—1 hour; laboratory—3 hours. Prerequisite:
course 110 prior to taking 110L recommended, but 110 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems covered in course 110.

111A. Advanced Systemic Physiology Laboratory (3) II. Adamson
Lecture—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour ses-
sions. Prerequisite: courses 110, 110L; courses 113, 114 recommended. Selected comprehensive experiments on the cardiovascular, respiratory, digestive, and nervous systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

111B. Advanced Systemic Physiology Laboratory (3) II. Adamson
Lecture—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour ses-
sions. Prerequisite: courses 110, 110L; 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.

111C. Advanced Systemic Physiology Laboratory (3) III. Adamson
Lecture—1 hour; laboratory—6 hours. Prerequisite:
courses 110, 110L, Statistics 13, course 112, 113, or
114 recommended. Interfacing physiological record-
ing equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpre-
tation within the framework of physiological concepts.

112. Neurosciences (3) I. Horowitz, Cartens
Lecture—3 hours. Prerequisite: course 110. Advanced presentation of concepts in neuroscience including neurons, dendrites, synapses, motor systems, and higher neural integration.

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg, Weidner
Lecture—4 hours. Prerequisite: course 110. Chem-
istry 6B, Physics 5B recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology. Emphasis on acid-base balance. Recommended for Physiology students, graduate students, and others in allied interests.

114. Gastrointestinal Physiology (3) III. Mencel
Lecture—3 hours; term paper. Prerequisite: course 110. Biochemistry 101B or Physiological Sciences 101A recommended. An introduction to gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastroi-
thenal tract; some pathology and nutritional items will be covered.

117T. Avian Physiology (3) II.
Lecture—3 hours. Prerequisite: course 110 or Biolog-
ical Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine system.

120A. Comparative Physiology: Neurointegrative Mechanisms (3) II. Wooley
Lecture—3 hours. Prerequisite: course 110. Compari-
sions of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neural and systemic levels.

120B. Comparative Physiology: Circulation (3) III. Goldberg
Lecture—3 hours. Prerequisite: course 110. Compari-
sions of physiological functions in the animal kingdom: cardiovascular. Comparative approach to cardio-
vascular function in vertebrates and invertebrates.

120C. Comparative Physiology: Digestion (3) III. Colvin
Lecture—3 hours. Prerequisite: course 110. Compari-
sions of physiological functions in the animal kingdom: digestion. Offered in even-numbered years.

120D. Comparative Physiology: Endocrinology (3) II. Mencel
Lecture—3 hours. Prerequisite: course 110. Compari-
sions of physiological functions in the animal kingdom: hormonal functions and their functions.

120E. Comparative Physiology: Respiration (3) II. Coch
Lecture—3 hours. Prerequisite: course 110. Compari-
sions of physiological functions in the animal kingdom: respiration. Offered in even-numbered years.

120F. Comparative Physiology of Sensory Systems (3) II. Silber
Lecture—3 hours. Prerequisite: course 110. Basic
physiological mechanisms involved in sensory sys-
tems. Comparative approach to considerations of mechano-sensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensi-
tive systems (vision, infrared detection, UV detec-
tion), electroreception, and pain. Emphasis on recep-
tors.

121. Physiology of Reproduction (3) II. Anderson
Lecture—3 hours. Prerequisite: course 110. Physiol-
gical mechanisms related to reproduction, breed-
ing efficiency, and fertility, with special reference to domestic animals.

121L. Physiology of Reproduction Laboratory (1) II. Anderson
Lecture—3 hours. Prerequisite: course 121 (may be taken concurrently) recommended. Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.)

130. Physiology of the Endocrine Glands (4) II. Mobberg
Lecture—4 hours. Prerequisite: course 110. Advanced
presentation of concepts in endocrinology with an emphasis on the role of hormones in reproduc-
tion, metabolism, and disease.

147. Aviation Physiology (3) II. Smith
Lecture—3 hours. Prerequisite: course 110. The
nature and physiological consequences of the eva-
0/0ion environment (altitude, acceleration, motion, etc.) and of protective devices (oxygen equipment, G-
suits, etc.). Field trips will be available (as course 198) to visit operational aviation physiology installa-
tions. Offered odd-numbered years.

148. Principles of Environmental Physiology (3) II. Fuller
Lecture—3 hours. Prerequisite: courses 110 and 100A, or Biochemistry 101A or the equivalent. Physi-
ological aspects of the interactions of organisms and environment at cellular, tissue, and organismal lev-
els. Emphasis on regulatory responses/mecha-

nisms to thermal, pressure and osmotic environ-
mental variables.

149. Environmental Physiology of Domestic Animals (3) III. Milmam
Lecture—3 hours. Prerequisite: courses 110-110L, or Biological Sciences 1B. Influences of environmental factors on physiological processes related to an-
imals including man. The nature of environmental variations which influence physiological responses are given emphasis.

190. Prosemnin in Physiology (3) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours. Prerequisite: courses 110 and 100A, one additional upper division course in physi-
ology or a related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research find-
ings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in all subject areas offered in physiology. (P/NP grading only.)

195B. Voluntary Control of Physiological Pro-
cesses (2) II, III. Lorenz
Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate upper division preparation in at least one of the following: physiology, behavioral science, computer science, physics, or electrical engineering; consent of instructor. Individual or team projects in voluntary control of physiological processes empha-
sizing the application of microcomputer-assisted feedback techniques. (P/NP grading only.)

196B. Voluntary Control of Physiological Pro-
cesses (1-4) II, III. Lorenz
Laboratory—3-12 hours. Prerequisite: course 195A, individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted feedback techniques. May be repeated for credit with a maximum of 6 units for 196A-196B course sequence. (P/NP grading only.)

199. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200L. Advanced General Physiology Laboratory (4) I. B. Wilson
Discussion—2 hours; laboratory—6 hours. Prerequi-
site: courses in undergraduate biochemistry, cell biol-
y, or general physiology, or consent of instructor. Design, performance, and interpretation of experi-
iments in cellular and general physiology with empha-

213. Principles of Electronics for Biologists (2) II. Horowitz, Scokey
Discussion—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 interconnec-
tion of laboratory instruments and electronic amplifiers and computers. Topics covered include: RC networks; operational amplifiers; digital gates; computer interfacing, and programming.

214. Electrophysiology (4) III. Cartens
Lecture—4 hours. Prerequisite: courses 111B, 112,
consent of instructor. Electrical activity of nerves and
effector functions (junctions; physiology of the ner-
vous system as studied by its electrical activity.

215. Neurophysiology Laboratory (3) III. Horowitz, Scokey
Discussion—3 hours; laboratory—9 hours. Prerequi-
site: course 214 (may be taken concurrently). Select-
ed experiments based on modern concepts to illus-
strate in depth, surgical techniques, stimulating and record-
ing techniques used in neurophysiology research.

216. Neurophysiology Laboratory (2) II. Pappone
Discussion—2 hours. Prerequisite: course 214. Criti-
cal reading and group discussion of current and classic original papers in neurophysiology.

217. The Vertebrate Eye (3) II. Silman
Lecture—3 hours. Prerequisite: course 112 or the

equivalent. The vertebrate eye will be considered from the standpoint of its physiology, biochemistry, and biol-
y. Retinal functions and mechanisms will be examined, with particular emphasis on the phot-
oreceptors. Offered in even-numbered years.

218. Topics in Circulatory Pathophysiology (3) II. Weidner
Lecture—1 hour; discussion—2 hours. Prerequisite:
course 113 (or the equivalent) or consent of instruc-
tor. Selected topics in circulatory or cardiorespiratory physiology will be addressed each offering. Topics
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. Chalupa (Psychology), Johnson (Optophthalmology).
Sobey (Neurology), Silfan 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 peripheral to highest brain functions. 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. Horwitz Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: course 100B; Biochemistry 101B or Physiology 101B; 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.)

291C. Selected Topics in Cellular Physiology and Biochemistry (2) II. Silfman, Trout (Biological Chemistry).
Seminar—2 hours. Prerequisite: one course in biochemistry; course 100A or Zoology 121A or 121B. General physiological correlates of cellular and molecular biology of living systems, with emphasis on cell form and function. One topic, representing a timely and important area of research, will serve as the focus throughout the course. May be repeated for credit. (SANE course as Biological Chemistry 291.)

291D. Research Approaches in Physiology (2) I. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: graduate standing in Graduate Group in Physiology or consent of instructor. Current research in physiology. Overall design of experiments and particular research areas. (SU grading only.)

291E. Selected Topics in Gastrointestinal Physiology (2) III. Mendel Lecture—1 hour; discussion—1 hour. Prerequisite: course 114 or 120C; Biochemistry 101B or Physiology 101B. In-depth coverage of selected topics in gastrointestinal physiology. Different topic covered each time course offered. May be repeated for credit. Offered in odd-numbered years.

297. Tutoring in Physiology (3) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; tutorial—2 hours. Prerequisite: completion of course to be tutored (with a grade of A) and consent of instructor. Advanced study of systems physiology through leading small discussion groups in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutoring in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (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
300A-300B. Pedagogical Aspects of Physiology in Higher Education (3-3) I, II, III. The Staff (Chairperson in charge)
Lecture, discussion, or laboratory, or combination. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of teaching, discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (SU grading only.)

**Physiology (A Graduate Group)**

Charles A. Fuller, Ph.D., Chairperson of the Group
Office: 168 Briggs Hall (916-752-0314)

Faculty. Consists of more than 70 faculty members drawn from 23 departments in the College of Agricultural 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. The programs emphasize broad training in the fundamental principles of physiology and in-depth specialization in cardiorrespiratory, 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. Horwitz (Animal Physiology); J.H. Jones (Phyiological Sciences), and P.A. Mols (Physical Education).

Admissions Officer. B.A. Horwitz (Animal Physiology).
Plant Pathology (College of Agricultural and Environmental Sciences)
John M. Dunway, Ph.D., Chairperson of the Department
Departmental Office, 354 Hutchinson Hall
(919-752-2030)

Faculty
Richard M. Bostock, Ph.D., Associate Professor
George Bruening, Ph.D., Professor
Edward E. Butler, Ph.D., Professor Emeritus
Robert N. Campbell, Ph.D., Professor
Michael R. Davis, Ph.D., Professor
James E. Devay, Ph.D., Professor
John M. Dunway, Ph.D., Professor
W. Harley Englund, Ph.D., Professor Emeritus
Bryce W. Falk, Ph.D., Associate Professor
David G. Gilchrist, Ph.D., Professor
Deborah A. Gilson, Ph.D., Lecturer
Raymond G. Grogan, Ph.D., Professor Emeritus
W. Douglas Gubler, Ph.D., Lecturer
William B. Hewitt, Ph.D., Professor Emeritus
Clarence I. Kado, Ph.D., Professor
Bruce Kirkpatrick, Ph.D., Assistant Professor
Bert Larr, Ph.D., Professor Emeritus
James D. MacDonald, Ph.D., Associate Professor
(Plant Pathology, Environmental Horticulture)
James J. Muntz, Ph.D., Associate Professor
Sreeko John M. Meechel, Ph.D., Lecturer
George Nyland, Ph.D., Professor Emeritus
Joseph M. Ogawa, Ph.D., Professor
Brett M. Tyler, Ph.D., Acting Associate Professor
Jerry K. Ueynoto, Ph.D., Lecturer
Ariana H.C. van Bruggen, Ph.D., Assistant Professor
Robert K. Webster, Ph.D., Professor

Related Major Program. See the major in Plant Science.

Graduate Study. The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate advisor. See also the Graduate Division section in this catalog.

Graduate Advisers. B.M. Tyler, J.J. Marois, A.H.C. van Bruggen, B. Kirkpatrick.

Courses in Plant Pathology
Upper Division Courses
120. Introduction to Plant Pathology (4) I. DeVay; III. Campbell
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 2 recommended.

125. Diagnosis and Control of Plant Diseases (4) I. MacDonald
Lecture—2 hours; laboratory—6 hours; field trips.

130. Physiology of Fungi (3) I. Gilchrist, Bostock
Lecture—3 hours. Prerequisite: Biological Sciences 1C; Biochemistry 101B and Botany 119 recommended.

135. Molecular Genetics of Fungi (3) I. Holland, Tyree
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 100A; Botany 119; courses 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (Same course as Biological Chemistry 217.) Offered in odd-numbered years.

188. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(PNP grading only.)

NOTE: For key to footnote symbols, see page 153.

Plant Physiology
See Botany for undergraduate majors, and Plant Biology (A Graduate Group) for graduate study.

Plant Physiology (A Graduate Group)
Students admitted into the Plant Physiology Graduate Group before June 30, 1899 will be allowed to complete their degree in this subject. New students, however, should see the Plant Biology Graduate Group section in this catalog.

Graduate Courses
201. Plant Senescence: Cellular and Molecular Aspects (4) II. Roman in charge
Lecture—4 hours. Prerequisite: Botany 111, 112, Biochemistry 101A-101B. Cellular and molecular phenomena associated with the senescence of plants and plant parts. Emphasis on principles and mechanisms. Offered in odd-numbered years.

208. Plant Hormones and Regulators (3) I. Labavich (Ponology), Yang (Vegetable Crops)
Lecture—3 hours. Prerequisite: Botany 112. Chemistry, biochemistry and physiological activity of major
classes of natural plant growth regulators. Primary consideration given to concepts that are of current research interest. Uses of growth regulators in agriculture. Offered in odd-numbered years.

214. High Plant Cell Walls (3) Labavich (Pomology), Nevins (Vegetable Crops)
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112, a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussion center on analysis of scientific papers related to lecture topics. Offered in even-numbered years.

217. Museum Biology of Plants (3) III. Bennett (Vegetable Crops)
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112 and Biochemistry 101B, or consent of instructor. Structure, biogenesis, and function of plant cell membranes. Emphasis will be placed on the molecular basis of plant membrane functions and on the role of membranes in selected physiological processes. Offered in even-numbered years.

230. Plant Growth Kinematics (3) I. Silk (Land, Air and Water Resources)
Lecture—2 hours; laboratory—3 hours. Prerequisite: introductory botany, calculus, and analytic geometry. Topics include growth curves, developmental indices, growth of the plant axis, leaf expansion, phytohormesis, growth of the apex, and environmental indices.

250. Faculty Seminar (1-I) I. The Staff Seminar—2 hours. Seminars presented by members of Plant Physiology faculty, describing their areas of research. (SU grading only.)

257. Tutoring in Plant Physiology (1-5-I), II, III.
The Staff Tutor—3–5 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (SU grading only.)

296. Group Study (1-5-I), II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing.

299. Research (1-12-I), II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (SU grading only.)

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### Plant Protection and Pest Management (A Graduate Group)

Bruce Jaffe, Ph.D., Chairperson of the Group

Group Office: 367 Briggs Hall (916-752-0475)

**Graduate Study.** The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Detailed information can be obtained from the Group Chairperson and the Graduate Announcement.

**Graduate Adviser.** A.A. Grishkoff (Entomology).

**Courses in Plant Protection and Pest Management**

**Graduate Courses**

201. Concepts and Systems of Plant Protection and Pest Management (4) I, II. Morris (Plant Pathology)
Lecture—2 hours; discussion—1 hour; laboratory—2 hours; field experiment and data analysis. Prerequisite: Entomology 110, Plant Pathology 120, Botany 120 (may be taken concurrently). Nematology 100; 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, II. Norris (Botany); III. Wilson (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, mites, 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 integrated programs.

290. Seminar (1-2-I), II, III. The Staff (Chairperson in charge)
(SU grading only.)

298. Seminar Group (1-5-I), II, III, III. The Staff (Chairperson in charge)

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

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### Plant Science

**College of Agricultural and Environmental Sciences**

**Faculty**

For faculty in departments offering areas of specialization (Depth Subject Matter) in Plant Science, under Departments of Agronomy and Range Science; Botany; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

**The Major Program**

The objective of the Plant Science major is to train students in the biological and natural sciences as applicable to the technology required for the production, protection, and maintenance of crop plants, and their quality following harvest.

The Plant Science student may choose to specialize in one of the seven departmentally designated options or may choose general education by electing the general Plant Science option. The option selected will be identified immediately following the name of the major, Plant Science, on the transcript.

The major Adviser serves as advisor for all students who opt for the Plant Science major. Following commitment to one option, the student is assigned to an adviser associated with the department offering expertise in that area.

Upon graduation, students may qualify for a career in their area of specialization or for advanced study leading to the M.S. or Ph.D. degrees. Each of the departments of Agronomy, Plant Pathology, and Vegetable Crops offers M.S. and Ph.D. degrees in their respective fields, while the M.S. degree in Horticulture is available through the departments of Environmental Horticulture, Pomology, and Viticulture and Enology.

Occupational opportunities exist in nurseries and green house management, farming, technical and sales positions in agricultural business and associated enterprises, such as packing and equity and supply companies, as well as in private, state and federal service in consulting and research.

**B.S. Major Requirements:**

(for convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Written/Oral Expression</th>
<th>8-11</th>
<th>See College requirement</th>
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<tr>
<td></td>
<td>Additional English (English 102 in plant science or related area, or English 104)</td>
<td>1-3</td>
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<tr>
<td></td>
<td>Preparatory Subject Matter</td>
<td>59-61</td>
<td>Computer science, biological science, and Management</td>
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<tr>
<td></td>
<td>Economics (Economics 1A or 1B)</td>
<td>5</td>
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**NOTE:** For key to footnote symbols, see page 133.
### Plant Science

**125. Geography 3: Landscape**  
**Architecture 111; Plant Pathology 125;**  
**Plant Science 101, 109, 113; Pomology 101;**  
**Soil Science 102; Vegetable Crops 101;**  
**Wildlife and Fisheries Biology 10.**

Courses offered in the natural sciences may be selected in consultation with an adviser.

#### Plant Pathology Option

Specific course requirements:  
- 10 Biochemistry 101A, 101B  
- 10 Botany 105, 119  
- 10 Chemistry 1C, 5  
- 3 Microbiology 2  
- 4 Nematology 100  
- 5 Plant Pathology 125  
- 10 Plant Science 105, 130  

**Plant Science Option**  

Specific course requirements:  
- 46-49 Plant Science (Plant Science 101, 102, 109, 113, 120)  
- 11 Agricultural economics (Agricultural Economics 18, 113, 120, 130, 150)  
- 3 Agronomy (Agronomy 101A, 101B)  
- 5 Environmental Horticulture (Environmental Horticulture 6, 105, 125, 130)  
- 4 Pomology (Pomology 101, 102)  
- 4 Vegetable crops (Vegetable Crops 101)  
- 4 Viticulture and enology (Viticulture 2)  
- 2 Biochemistry (Biochemistry 101A, 101B)  
- 6 Environmental toxicology (Environmental Toxicology 101)  
- 4 Soils (Soil Science 109)  

#### Pomology Option

Specific course requirements:  
- 15 Pomology 101, 102  
- 8 Plant Science 106, 112  

Additional courses to be selected with consent of the adviser from the following:  
- 30 Agricultural Economics 112, 140; Agricultural Engineering Technologist 101A; Agronomy 100, 101L; Agricultural Science 100; Botany 119, 119L; International Agricultural Development 101; Nematology 100, 110; Plant Pathology 125, 130; Plant Science 101, 102, 112, 121L, 133; Pomology 103, Soil Science 102, 109, 129; Vegetable Crops 101, 116; Viticulture and enology 110, 116; Water Science 110.

Natural sciences electives, not to exceed 8 units, may also be included.

#### Vegetable Crops Option

Specific course requirements:  
- 19 Vegetable Crops 101, 105, 150  
- 12 Plant Science 102, 112  

Additional units selected with consent of adviser from the following:  
- 29 Agricultural Economics 130; Biochemistry 101A, 101B, 122; International Agricultural Development 110A, 110B, 141; Plant Pathology 125; Plant Science 101, 103, 112L, 123, 126, 135, 196, 270; Soil Science 109. Vegetable Crops 118, 198; one unit of seminar to be selected with consent of adviser in subject matter area of specialization; 2 units of 190 or 198 or 9 units of 199 may be applied toward requirement. A minimum of 8 units is available.

Natural sciences electives, not to exceed 8 units, may also be included.

#### Viticulture Option

Specific course requirements:  
- 34-35 Biochemistry 101A, 101B  
- 6 Plant Science 101, 102, 109, 112  
- 12 Viticulture and enology 2, 101A, 101B, 101C, 110 or 111, 115 or 116, 118  
- 16-17 Additional courses to be selected with the consent of the adviser from the following:  
- 10 Agricultural Economics 18, 140, 150; Agricultural Engineering Technology 101A; Agricultural Practices 49, 149; Atmospheric Sciences 106; Biochemistry 122; Nematology 100, 110; Plant Pathology 125; Plant Physiology 108; Plant Science 103, 112, 113, 122, 202; Soil Science 102, 108, 150; Viticulture and enology 110, 111, 210, 216; 217, 219; Water Science 103, 110, 172.

Natural sciences electives, not to exceed 8 units, may also be included.

#### Unrestricted Electives

- Total Units for the Major:  
- 0-30

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

**Related Courses.** See under Agronomy, Environmental Horticulture, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

**Courses in Plant Science**

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center (see above).

#### Lower Division Courses

1. **Production of Cultivated Plants (5)**: Salvest, J.  
   Rappaport (Vegetable Crops)  
   Lecture—2 hours; discussion—2 hours; laboratory—2 hours; V.A.S.—3 hours. Principles of plant production, improvement, propagation, harvesting, preserving, processing, and marketing. Course will proceed by the Video-Audio-Self-Tutorial method with students making use of the learning facilities at their own convenience.

2. **Plants and People (3)**: Nevin (Vegetable Crops)  
   Lecture—3 hours. Prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. General Education credit: Nature and Environment (interdepartment).

3. **Plant Science Internship (1-5)**: I, II, III, summer. The Staff (Rains in charge)  
   Laboratory—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/N grading only).

4. **Directed Group Study (1-5)**: I, II, III. The Staff (Rains in charge)  
   Prerequisite: lower division standing. (P/N grading only)

#### Upper Division Courses

1. **Ecology of Crop Systems** (4)  
   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 holistic views of the physical environment, photosynthetic productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change.

2. **Physiology of Cultivated Plants** (4)  
   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.

3. **Evolution of Crop Plants** (3)  
   Lecture—2 hours; discussion—1 hour (a few sessions will be used for laboratory work on plant material). Prerequisite: course 10; introductory genetics (e.g., Genetics 100). Overview and demography of economic plants; principles of plant evolution; centers of origin; genetic diversity and germ plasm collections; implications in new agricultural developments. Offered in even-numbered years.

4. **Plant Cell, Tissue, and Organ Culture** (5)  
   Lecture—2 hours and laboratory—6 hours (intensive 6-day session); seminar—1 hour and research projects. Prerequisite: Botany 111, 112 (may be taken concurrently); consent of instructors. Basic and applied aspects of plant tissue culture methodology with emphasis on quantification. Intensive one-week methodology section will be conducted before spring quarter, but can extend into the first week of instruction. Application of methodology will extend throughout the quarter with weekly seminars and individual research projects.

5. **Plant Propagation** (4)  
   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.

6. **Postharvest Physiology and Handling of Horticultural Commodities** (3)  
   Lecture—3 hours; demonstration—discussion—2 hours; laboratory—2 hours. Prerequisite: Genetics 100 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

7. **Plant Breeding** (4)  
   Lecture—3 hours; demonstration—discussion—2 hours. Prerequisite: Genetics 100. The principles of plant breeding applied to economic crops.

8. **Physiological Genetics of Crop Plants** (3)  
   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 regulation and the impact of the environment on development of plants. Offered in odd-numbered years.

9. **Physiology of Environmental Stresses in Plants** (3)  
   Lecture—3 hours. Prerequisite: Genetics 100; Botany 111, 112; or consent of instructor. Principles and recent advances in the physiology of environmental stresses in plants. Emphasis emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses.

10. **Mineral Nutrition of Plants** (4)  
    Lecture—3 hours. Prerequisite: Botany 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. (Same course as Botany 135.)
140. Principles of Plant Biotechnology (3) II. Dan- deker (Pomology) Lecture—3 hours. Prerequisite: Biological Sciences 1A and Genetics 100. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement.

192. Internship (1-12) I, II, III, summer. The Staff (Rains charge) Laboratory—363 hours. Prerequisite: completion of 54 units and consent of instructor. Work-learn experience with current plant student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks in an alternating last day of spring quarter. Considered a spring course for preenrollment. (P/SP grading only.)

197T. Tutoring in Plant Science (1-4) I, II, III. The Staff (Rains and Range Science in charge) Prerequisite: upper division standing; completion of course being tutored or the equivalent. Leading discussion sections, conducting laboratory exercises, and providing general guidance in a self-instruction format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/SP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Rains in charge) Prerequisite: consent of instructor. (P/SP grading only.)

Graduate Courses

202. Advanced Physiology of Cultivated Plants (3) I. Sachs (Environmental Horticulture), Labovitch (Pomology) Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101 and 102, Botany 111, 112. Selected physiological topics generally focusing on source-sink interactions influencing growth and development. Offered in even-numbered years.

216. Advanced Topics in Mineral Nutrition (4) III. Laucht (Land, Air and Water Resources) Lecture—3 hours; discussion—1 hour. Prerequisite: course 135 or consent of instructor. Cellular compartmentation of mineral elements, new methods and techniques in selected topics in absorption, translocation, metabolism, and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. Offered in odd-numbered years.

221A-221B. Applied Crop Physiology (4-4) III. Shennan (Vegetable Crops) Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: courses 101 and 102 or Botany 111, 112 or consent of instructor. Research methods in applied crop physiology with examples drawn primarily from agricultural and horticultural crops. Field and laboratory projects, data reduction, and preparation of suitable 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 impact on genetic variation, evaluation, and cultural practices. Offered in odd-numbered years.

291. Seminar in Postharvest Biology (1-12) I, II, III (Faculty of the Interdepartmental Postharvest Biology Group) 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. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Rains charge) Laboratory—36 hours. Prerequisite: completion of 54 units and consent of instructor. Work-learn experience with current student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks in an alternating last day of spring quarter. Considered a spring course for preenrollment. (P/SP grading only.)

297T. Tutoring in Plant Science (1-4) I, II, III. The Staff (Rains and Range Science in charge) Prerequisite: upper division standing; completion of course being tutored or the equivalent. Leading discussion sections, conducting laboratory exercises, and providing general guidance in a self-instruction format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/SP grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Rains in charge) Prerequisite: consent of instructor. (P/SP grading only.)

Plastic Surgery

See Medicine, School of

Political Science

(College of Letters and Science)

Larry Berman, Ph.D., Chairperson of the Department
Department Office, 227 Voorhis Hall (916-752-0666)

Faculty

Donna L. Bahy, Ph.D., Professor
Larry Berman, Ph.D., Professor
Edmond Costantini, Ph.D., Professor
Philip L. Dubois, Ph.D., Professor
Richard G. Wible, Ph.D., Professor
John B. Gates, Ph.D., Assistant Professor
Emily O. Goldman, Ph.D., Assistant Professor
Alexander J. Groth, Ph.D., Professor
Charles M. Hardin, Ph.D., Professor Emeritus
Stuart L. Hill, Ph.D., Associate Professor
Mary Jackman, Ph.D., Professor (Political Science, Sociology)
Robert J. Jacobi, Ph.D., Professor
Clyde E. Jacobs, Ph.D., Professor Emeritus
Bruce W. Jerjesiew, Ph.D., Associate Professor
Joyce K. Kallgren, Ph.D., Professor
Lloyd D. Musolff, Ph.D., Professor Emeritus
Miroslav Nincic, Ph.D., Professor
John R. Orwin, Ph.D., Professor Emeritus
Larry L. Peterson, Ph.D., Professor
Donald S. Rood, Ph.D., Professor
Richard N. Sopnoff, Ph.D., Assistant Professor
Randolph M. Stevens, Ph.D., Professor
Andrew Stackhouse, Ph.D., Assistant Professor
Alvin D. Sokolow, Ph.D., Professor
Larry L. Wade, Ph.D., Professor
Geoffrey A. Wandersdorff-Smith, Ph.D., Associate Professor
(Political Science, Environmental Studies)
Young-Kwan Yoon, Ph.D., Assistant Professor
Marvin Zetterbaum, Ph.D., Professor
Paul E. Zinner, Ph.D., Professor

The Major Programs

Political Science is the study of politics and political systems at the subnational, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Department of Political Science offers two major programs: Political Science and Political Science—Public Service. Both provide students with preparation for subsequent careers as well as with a better understanding of politics in general and of the political systems in which they live.

A major in Political Science aims to provide a broad understanding of political concepts and values, political institutions, political behavior and political processes. It offers excellent preparation and background for later careers in government, politics, law, journalism, business, urban planning, administration and teaching.

The Political Science—Public Service major is designed for students who have a specific interest in a career or other activities in or around government. This undergraduate program can also serve as preparation for enrollment in graduate and professional schools. The major combines regular course work in political science and related fields with two quarters of public affairs internship for which academic credit is granted. It differs from the regular Political Science major in having the internship as a requirement and in emphasizing upper division coursework in functional and substantive policy areas of American Government. The functional areas are policy formulation, implementation, and interpretation and the substantive policy areas include urban, environmental, or others designed by the student and faculty counselors. Courses taken in other departments, for example, Economics, Environmental Studies, Environmental Biology and Management, may also be used to satisfy the major.

Political Science

A.B. Major Requirements:

Preparatory Subject Matter .......................... 19-20
Three courses from Political Science 1, 2, 3, 4, 5, 7 ................................................ 11-12
(Course 7 may not be taken if course 5 is taken)
Depth Subject Matter .................................. 36
Select two courses in each of three fields, listed below. The fields must be chosen from at least two groups, A, B, or C....................................................... 24
Group A
(1) Political theory: Political Science 111-119
Group B
(2) American government: Political Science 100-103, 171, 172-175, 191, 195
(3) Parties and political behavior: Political Science 160-170
(4) Public law: Political Science 150-158
(5) Public administration: Political Science 180-189
Group C
(6) Comparative government: Political Science 140, 141, 145-146B, 177-178
(7) International relations: Political Science 120-139
Additional upper division units in political science to achieve a total of 36 .......................... 12
Only 5 units of Political Science 192 (internship) may be counted towards the 36-unit requirement; and Political Science 192A or 192B may not be counted toward a field requirement.

Total Units for the Major .................................. 55-56

Political Science—Public Service

A.B. Major Requirements:

Preparatory Subject Matter .......................... 11-12
One course from Political Science 1, 5, or 7 ......................... 3-4
Two courses from Political Science 2, 3, 4A, 4B, 4C, 10 .................................................................. 8
Recommended: Economics 1A-1B

Depth Subject Matter .................................. 48
Core program .......................... 12
Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 108, 109, 114
Internship, Political Science 192A, 192B, 192C ................................................... 10
Research paper, Political Science 193 .......................... 2

NOTE: For key to footnote symbols, see page 133.
Fields of concentration...24
Select six upper division courses from:
Two upper division units in polisci listed
below with at least two courses in
each field selected; at least 16 of the
units must be polisci courses. (Core
Program course may not be counted
here.)
Total Units for the Major...59-60
Fields of Concentration
(3) Policy interpretation—Substance and procedures (public/pre-law): Political Science 151, 152, 153, 155, 156.
(4) Policy areas:
b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.
c) Policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Public Service adviser).
Major Advisers. Consult Departmental Office.

Minor Program Requirements:
Students electing a minor in Political Science may choose one of two plans:

UNITs
Political Science...24
Policy interpretation—Substance and procedures (public/pre-law): Political Science 151, 152, 153, 155, 156.
Policy areas:
b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.
c) Policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Public Service adviser).
Major Advisers. Consult Departmental Office.

Political Science...24
Plan I: Upper division units in political science (may include 4 units of lower division courses) distributed among at least two of the three Groups, A, B, and C, designated in the general Political Science major...24
Plan II: Upper division in political science, with the approval of the minor adviser...24
This plan does not require a distribution of courses in any particular group, nor as much as the courses chosen will be those most appropriate to the student's academic major.
Teacher Credential Subject Representative. Consult Departmental Office. See also the section on the Teacher Education Program.
Graduate Study. The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.
Graduate Adviser. Consult Departmental Office.
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 Voorhis Hall, 752-1889.
American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses:
1, 5, 100, 101, 103, 104, 106, 108, 109, 113, 130, 131, 160, 163. (See also under University requirements.)

Courses in Political Science
Lower Division Courses
1. American National Government (4) I. Hile; II. Costantini; III. Bereman 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/Introduc- tory. (CAN Gov 2)
2. Introduction to Comparative Politics (4) I. Groth Lecture—3 hours; discussion—1 hour. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. General Education credit: Contemporary Societies/Introduc- tory.
3. International Relations (4) I. Nincic; II. Goldberg; III. Siverson Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.
4. Basic Concepts in Political Theory (4) I. Zetter- baum 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/Introduc- tory.
5. Contemporary Problems of the American Political System (3) I. Skalaban Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies.
6. Contemporary Issues in Law and Politics (4) I. Gates Seminar—4 hours. A freshmen-sophomore 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.
99. Special Study for Undergraduates (1-5) I., II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)
Upper Division Courses
100. Local Government and Politics (4) I. Sokolow Lecture—3 hours; discussion—1 hour. Prerequisite: upper division consent of instructor. Political and government of local communities in the United States, including cities, counties, and special districts. Emphasizes sources and varieties of community conflict and the development of adequate policies, behavior, and executive patterns. Decision making, and the politics of structure. Observation of local governing boards.
101. Urban 'Political 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 structures to achieve their objectives and why they succeeded or failed.
102. Urban Public Policy (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among urban political systems, suburban, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and the persons and groups who ben- efit from the policies in these areas.
103. American Federalism (4) III. Sokolow Lecture—3 hours; research paper. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of national-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current political issues, and management of intergovernmental programs.
104. California State Government and Politics (4) I. Sokolow Lecture—3 hours; research paper. The California political system. Political culture, constituent, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.
105. The Legislative Process (4) III. The Staff Lecture—3 hours; discussion—1 hour. Analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislation and policy making, legislators and constituents, relations between Congress and other agencies.
106. The Presidency (4) I. Bereman or staff Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections.
107. Environmental Politics and Administration (4) I. Wandelsoe-Smith Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation.
108. Policy Making in the Public Sector (4) I. The Staff Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making.
109. Public Policy and the Governmental Process (4) III. Wade Lecture—3 hours; research paper. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities.
111. Systematic Political Science (4) II. The Staff Lecture—discussion—4 hours. Philosophical basis of modern political science; major specific approaches selected concepts relevant to modern political concerns; and research design and execution.
112. Contemporary Democratic Theory (4) I. 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 odd-numbered years.
113. American Political Thought (4) I. Snopoli 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 emerged from the founding period to the present.
114. Quantitative Analysis of Political Data (4) I. Skalaban 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 odd-numbered years.
115. Medieval Political Thought (4) II. Peterman Lecture—3 hours; term paper. Prerequisite: course 114A. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history.

Note: For key to footnote symbols, see page 133.
118. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher (4) I. Petersen
Lecture—discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

119. Marxism (4) J. Schum
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. Peterson
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

118B. History of Political Theory (4) II. Petersen
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 analysis of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre, Rawls.

119. Modern Political Thought (4) I. Sinopoli
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study of major political 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) II. Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare.

122. International Law (4) II. The State
Lecture—4 hours. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes.

123. The Politics of Interdependence (4) I. I. Yoon and staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implications on national policies and politics.

124. The Politics of Global Inequality (4) III. Yoon
Lecture—3 hours; term paper. Prerequisite: upper division standing; course 123 recommended. Long-standing divisions between the global South and North have taken on new importance in the 20th century. 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) I. Rothchild
Lecture—3 hours; individual meetings with students to prepare reports. Prerequisite: one international relations course recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts, e.g., South Africa, Northern Ireland. Compares the role of the international community in facilitating the peaceful resolution of conflicts.

127. Nationalism and Imperialism (4) II. Kailgren
Lecture—4 hours. Prerequisite: upper division standing; course 2 recommended. Issues of nation building illustrated by Western and non-Western experience. Offered in even-numbered years.

128. International Communism (4) III. Zinner
Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. Interna tional communist movement; ideology organization strategy. Relations among communist parties; problems of leadership and social composition; the Stalin-Soviet conflict and its effects on revolutionary struggle. Offered in even-numbered years.

129. Special Studies in International Politics (4) III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied.

130. Recent U.S. Foreign Policy (4) II. III. Ninic and staff
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in the 20th century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of contemporary foreign policy issues.

131. Analysis of U.S. Foreign Policy (4) I. Goldman
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation of the foreign policy formulation and execution 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) III. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. Development of national security policies since 1945. Analysis of deterrence and armament policies upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control.

133. The American Role in East Asia (4) I. Kailgren
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on Asian westernization of U.S. governmental East Asian policy; relations with and European and communist students. Offered in even-numbered years.

134. Africa and U.S. Foreign Policy (4) I. Rothchild

135. Soviet Foreign Policy (4) III. Zinner, Bahy
Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. A study of Soviet foreign relations in contemporary world affairs; ideology and power as mainstays of policy; policy as an instrument of revolution; the role of diplomacy, economic aid and military arms.

137. International Relations in Western Europe (4) II. Zinner
Lecture—4 hours. Prerequisite: upper division standing; consent of instructor. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, Communion in Western Europe and the relationship between domestic politics and foreign policy.

138. International Relations: East Asia (4) I. Kailgren
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Analysis of international relations and diplomacy in East Asia. Emphasis upon twentieth-century problems with examples from China, Japan, Korea, and Southeast Asia.

139. Comparative Public Policy (4) II. Frank
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Comparative study of one or more public policies in foreign countries. May be repeated once for credit when different topic is studied.

140. Comparative Public Policy (4) II. Groth
Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

141. Communist Political Systems (4) I. III. Bahy, Zinner
Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.

142. Politics and Inequality (4) II. Jackman
Lecture—3 hours; term paper or discussion—1 hour. Examine the linkages between politics and the distribution of social and economic goods. Topics include the impact of civil rights legislation, the political welfare state and the effects of political participation on the distribution of goods.

145. Government and Politics in Emergent Nations (4) I. Zinner
Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedures in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in even-numbered years.

146. Contemporary African Politics (4) I. Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of party systems, military coups, bureaucracy, regional integration, and disintegration, and economic development in Africa south of the Sahara.

147. Politics and Policy in Western Europe (4) II. The Staff
Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.

448. Government and Politics in East Asia: China (4) I. Kailgren
Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political culture, institutions, economy of selected nations in Southeast Asia including Vietnam plus two or three other examples. Emphasis on imperialist legacy, nation building in multi-ethnic communities, contrasts between socialist and non-socialist development models. Offered in even-numbered years.

449. Politics of Development in East Asia (4) I. Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite: course 134 recommended. Analysis of the developmental process in the region of East Asia. Emphasis will be placed upon social development, political and economic environment, strategies of development, party systems, bureaucracy and military coups. Course is considered part of a year-long interdepartmental sequence of courses on East Africa, which includes History 145B.
150. Judicial Politics and Constitutional Interpretation (4) II. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking; issues surrounding constitutional interpretation and decision making; prerequisite for courses on the politics of constitutional law.

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4) II. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. The constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs, and the right to privacy.

152. The Constitutional Politics of Equality (4) III. Dubois Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of equality in the American political system: issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in even-numbered years.

153. The Constitutional Politics of the Justice System (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of the American criminal justice system; issues surrounding constitutional and judicial policymaking on issues such as search and seizure, arrest, trial, incarceration, and other issues of due process. Offered in odd-numbered years.

154. Legal Philosophy (4) III. Sinopoli Lecture—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 even-numbered years.

155. Judicial Process and Behavior (4) II. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making. Relations among courts and other decision-making bodies. Offered in even-numbered years.

156. Law and Society (4) II. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social bases and origins of law; relationship between law, institutions, and social change. Offered in odd-numbered years.

160. American Political Parties (4) I. Costantini Lecture—3 hours; discussion—1 hour. Analysis of the structure of the operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party ideology. Offered every other year.

161. Comparative Political Parties (4) II. The Staff Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties especially in Great Britain and France but with some reference to other Western European countries.

162. Elections and Voting Behavior (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and national doctrine and judicial policymaking.

163. Group Politics (4) I. M. Jackman; II. Wade Lecture—3 hours; discussion—1 hour. Groups, institutions, and individuals, especially in American politics. Historical and analytical treatment of group theories and applications 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 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Public opinion and public policy. What 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 polls and its problems.

165. Mass Media and Politics (4) III. Costantini Lecture—3 hours; discussion—1 hour. Organization and decision making within the media; media audiences and the role of the media producer; the impact of different social class, race, and ethnicity upon the involvement of women in politics.

167. Political Socialization (4) II. Costantini Lecture—3 hours; discussion—1 hour. Prerequisite: course 164. Political socialization and the effect of family, the media, and the community on what one learns about politics, and when and how they learn it. The process, content, and sources of political learning, particularly in pre adulthood, and the significance of such factors for the political system as well as for the development of the political self.

168. Chicanos Politics (4) II. Riddell (Chicano Studies) Lecture—3 hours; discussion—1 hour. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment.

169. Politics and Policy (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: 1 course, 2, 3, or 4, or consent of instructor. Background, careers, motives and beliefs of political leaders. Place of elites in a democratic polity; elite mass differences; conflict and consensus among elites.

170. Politics and Personality (4) III. Berman Lecture—3 hours; discussion—1 hour. How is conduct of politics influenced by personal qualities of political actors? How is political ideology and behavior developing criteria for analyzing political phenomena in psychologists by examining selected writings of twentieth-century theorists and psychobiographies.

171. The Politics of Energy (4) II. Wandersfontein-Smith Lecture-discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of political processes for making energy choices at the international, national, and local levels. Emphasizes interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation.

172. Ideology of Class, Race, and Gender (4) I. Jackman Lecture—4 hours. Examination of popular belief systems that accompany relations between social classes: whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups?

173. Community Power and Change (4) II. M. Black Lecture—3 hours; discussion—1 hour. An examination of the relationship between general community characteristics, the distribution of political power, and policy outcomes in the United States. Alternative models of community political change are presented.

174. Government and the Economy (4) I. Skalaban Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest; and the public interest in the role of government bureaucracies in the total society.

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

NOTE: For key to footnote symbols, see page 133.
199. Politics of Budgeting and Finance Administration (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society, politics of revenue and resource allocation; tax policy; intergovernmental financial relations; budget formulation and execution; alternative methods of resource allocation; budget as a tool of management.

*190. International Relations (4) II. Zinner
Lecture—2 hours. Prerequisite: open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals.

191. Special Studies in Local Government and Politics (4) III. Sokolow
Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor; enrollment limited to advanced students. Intensive study of one or more topics relating to urban policy and politics, designed for advanced students. Group projects and field work in one or more communities are emphasized.

192A. Internship in Public Affairs (5, 6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only)

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 Political Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only)

193. Research in Practical Politics (2) I, II, III. The Staff
Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science—Public Service majors for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of politics.

194HA-194HB-194HC. Special Study for Honors Students (2-36) I, II, III. The Staff
Directed research. Prerequisite: major in Political Science or Political Science—Public Service with junior standing and overall grade-point average of 3.5. Directed research, reading, and writing culminating in the submission of a senior honors thesis and direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

*195. Special Studies in American Politics (4) II. The Staff
Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to American politics. May be repeated once for credit when subject matter changes.

196. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

197. 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) I. Sokolow
Seminar—4 hours. Survey and analysis of the literature on modern forms 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 odd-numbered years.

202. American State Government and Politics (4) I. Sokolow
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 even-numbered years.

203. American National Government (4) III. Seeman
Seminar—4 hours. Survey and analysis of the literature in the field of American Government. Emphasis on development of methodologies for the study of American Government, and on the development of theories and concepts for understanding the behavior and performance of major national institutions.

205. Field Research in Urban Politics and Policy (4) II. Sokolow
Seminar—2 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

207. Environmental Public Policy (4) II. Wandersee
Seminar—4 hours. Analysis of the interface between the world of governmental action and the world of scientific knowledge, and the role of policy in influencing action. Focus on the development of methodologies for the study of environmental and energy policy, including legal and institutional aspects.

208. Policy Analysis (4) III. Hill
Seminar—4 hours. Social science techniques applied to policy field research organization and analysis.

209. The American Political System (4) I, II. Wade, Hill
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

210. Political Theory (4) III. Sinopoli
Seminar—3 hours.

214. The International System (4) III. Swenson
Seminar—3 hours. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data collection and analysis.

220. American Foreign Policy (4) III. Goldman
Seminar—3 hours.

221. U.S. Political Culture and Foreign Relations (4) I. Rothchild
Seminar—3 hours. Analysis of political culture of the U.S. and its relationship to foreign policy. Focus on the role of political culture in shaping foreign policy and the role of foreign policy in shaping political culture.

241. Communist Political Systems (4) I. Bahry
Seminar—4 hours. Prerequisite: course 141 or the equivalent. Emphasis on the analysis of political systems and the role of political culture in shaping foreign policy.

242. Seminar in Comparative Politics (4) II. Groth
Seminar—4 hours. Prerequisite: 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. Emphasis on the role of political culture in shaping foreign policy and the role of political culture in shaping political culture. Offered in odd-numbered years.

248. Politics of East Asia (4) III. Kailgren
Seminar—3 hours. Selected contemporary problems of government and international relations in East Asia.

260. Political Parties (4) II. The Staff
Seminar—3 hours. Survey of selected topics in American and comparative parties.

261. Political Behavior (4) III. Costantini
Seminar—3 hours. Survey of selected topics in political behavior and public opinion.

282. Concepts and Problems in Administrative Policy (4) I. Gable
Seminar—4 hours. Survey of selected topics in administrative policy and public administration.

283. Organizations and Political 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. Survey of selected topics in administrative values. Offered in odd-numbered years.

290A. Research in American Government and Public Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

290B. Research in Political Theory (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

290C. Research in International Relations (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

290D. Research in Judicial Politics (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

290E. Research in Political Parties, Politics, and Political Behavior (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior.

290F. Research in Comparative Government and Policy (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

290G. Research in Public Administration (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

297. Internships in Political Science (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated with credit.

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)

299D. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Professional Course

360. The Teaching of Political Science (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate student
standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (SU grading only.)

Pomology
(County of Agricultural and Environmental Sciences)
Adel A. Kader, Ph.D., Chairperson of the Department
Department Office, 1045 Wicks Hall (916-752-0123)

Faculty
James A. Beutel, M.S., Lecturer
Frederick A. Bliss, Ph.D., Professor
Royce S. Brinshurt, Ph.D., Professor Emeritus
Dillon S. Brown, Ph.D., Professor Emeritus
Patrick H. Brown, Ph.D., Assistant Professor
Robert M. Carlson, Ph.D., Lecturer
Peter B. Catlin, Ph.D., Lecturer
Julian C. Cran, Ph.D., Professor Emeritus
Abhaya M. Dandekar, Ph.D., Assistant Professor
Theodore M. Dejong, Ph.D., Associate Professor
Louise Ferguson, Ph.D., Lecturer
Thomas M. Gradziej, Ph.D., Assistant Professor
William H. Griggs, Ph.D., Professor Emeritus
Paul E. Hareche, Ph.D., Professor
Hudson T. Hartmann, Ph.D., Professor Emeritus
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
Dale E. Kester, Ph.D., Professor
John M. Labavitch, Ph.D., Professor
Omund Lilelend, Ph.D., Professor Emeritus
George C. Martin, Ph.D., Professor
Gale Mattoch, Ph.D., Associate Professor
Warren C. Miecke, M.S., Lecturer
F. Gordon Mitchell, M.S., Lecturer
Dan E. Parfitt, Ph.D., Lecturer
Vito S. Polito, Ph.D., Professor
David E. Ramos, Ph.D., Lecturer
Roger J. Romani, Ph.D., Professor
Kay Ruygo, Ph.D., Professor Emeritus
Kenneth A. Shackle, Ph.D., Associate Professor
Douglas V. Shaw, Ph.D., Assistant Professor
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Sutter, Ph.D., Associate Professor
Kiyoto Uru, Ph.D., Professor Emeritus
Steven A. Weinbaum, Ph.D., Professor

Related Courses: See Plant Science 109, 112, 113, 140, 196.

Graduate Study: For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Division section in this catalog.

Courses in Pomology
Lower Division Courses
10. Fruit and Nut Crop Production and Utilization (3) I, Martin in charge
Lecture—2 hours; discussion—1 hour. Introduction to pomology including: climatic adaptation of deciduous fruits; orchard planning and management; tree nutrition and physiology; fruit development, maturation, and harvesting; protection from cold; quality, storage, transportation, and marketing.

92. Internship In Pomology (1-12) I, II, III. The Staff
Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

Upper Division Courses
101. Tree Growth and Development (4) II. Dejong, Catlin
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101 or Plant Science 102 or consent of instructor. Physiology of fruit plant growth and maintenance; species adaptation; responses to environment and cultural modification (pruning, soil and water management, etc.)

102. Principles of Fruit Production (4) III. Weinbaum, Gradziej
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 110 or Plant Science 102. The course covers 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. Shackle in charge
Lecture—3 hours; field trips (2). Prerequisite: Biological Sciences 110 or Plant Science 102. Subtropical fruits as important economic and nutritional resources; their origin, distribution, botanical nature, culture, production and utilization with particular emphasis on citrus but including avocados, dates, macadamias and various other species. Offered in odd-numbered years.

107. Small Fruit Production (2) II. Shaw
Lecture—2 hours; two field trips arranged at mutual convenience. Prerequisite: Biological Sciences 110 or the equivalent. Strawberries (Fragaria), blackberries, raspberries (Rubus), blueberries-cranberries (Vaccinium), and currants-gooseberries (Ribes) as important nutritional resources; their origin, production and utilization with emphasis on recent progress in integrated management. Offered in even-numbered years.

170A-170B-170C. Applied Pomology (2-2-2) I-II-III. Ramos, Southwick, Miecke, Martin
Lecture—seven 2-hour sessions; two full-day field trips. Prerequisite: Introductory course in pomology or consent of instructor. Overview of production and handling of major pomological crops including a clinical study of important cultural and harvesting activities and problems associated with commercial fruit growing. Offered in odd-numbered years in fall quarter; offered in even-numbered years in winter and spring quarters.

192. Internship In Pomology (1-12) I, II, III. The Staff
Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
203. Current Perspectives in Fruit Tree Physiology (3) I. Weinbaum, Dejong
Lecture—2 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Botany 111, 112 or Plant Science 102; courses 101 and 102. Current advances/concepts regarding physiological bases of developmental phenomena specific to and/or characteristic of deciduous perennial fruit plants. Offered in odd-numbered years.

205. Water Relations and Mineral Nutrition of Deciduous Fruit Crops (4) III. Carlson, Shackle
Lecture—3 hours; two full-day field trips. Prerequisite: Soil Science 109, Botany 111, 112 or Plant Science 102. Development and distribution of roots, 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 odd-numbered years.

210. Fruit Morphology (4) III. Polito
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105 or 111. Reproductive morphology of flowering plants with emphasis on tree-crop species. Topics include flower initiation and development, pollination and fertilization, fruit and seed development. Offered in even-numbered years.

NOTE: For key to footnote symbols, see page 133.
Psychology
(College of Letters and Science)
Donald H. Owings, Ph.D., Chairperson of the Department
Department Office, 149 Young Hall (916-752-1680)

Faculty
Leo P. Acordado, Ph.D., Professor
Jasmin, R. Bastian, Ph.D., Professor Emeritus
Leo M. Chalupa, Ph.D., Professor
Richard G. Coss, Ph.D., Professor
William F. Dukes, Ph.D., Professor Emeritus
Rebecca A. Eder, Ph.D., Assistant Professor
Alan C. Elms, Ph.D., Professor
Robert A. Emmons, Ph.D., Assistant Professor
Karen P. Erickson, Ph.D., Professor
Allop A. Harrison, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor
Joel T. Johnson, Ph.D., Associate Professor
Neal E. Kroll, Ph.D., Professor
Debra L. Long, M.S., Assistant Professor
Joseph Lyons, Ph.D., Professor Emeritus
Peter R. Marier, Ph.D., Professor
William A. Mason, Ph.D., Professor
Sally P. Mendola, Ph.D., Assistant 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
Stephanie A. Shroyer, Ph.D., Associate Professor
Dean K. Simonton, Ph.D., Professor
Robert Sommer, Ph.D., Professor
Charles T. Tart, Ph.D., Professor

The Major Programs
Psychology is both a science and a form of humanistic inquiry. It provides knowledge about human and animal behavior and constitutes a background for examining your own behavior and that of other people. The Psychology program has several objectives: it presents an introduction to the study of individual and group behavior; it provides a liberal arts major for students looking for employment in business, government, personnel work, or other fields directly after obtaining their bachelor’s degree; and it prepares students for graduate study in various areas of psychology, leading to teaching, research, and applied work. Courses and other careers in psychology require graduate-level training.

The psychology program at UC Davis is extremely broad and represents a wide variety of interests. The offerings are organized around three major focal points: Personality/Personality emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, humanistic psychology, and motivation. Psychology 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 stresses the roles of consciousness, language, perception and learning in making us what we are.

The Department offers both the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program geared for students planning careers in either biology or mathematics. Each program involves an introduction to each of the three areas of psychology. In addition to completing the required core courses, majors may also take specialty courses on topics such as gender, aging and maturity, environmental awareness, altered states of consciousness, and primate behavior.

A prerequisite for declaring a major in Psychology is to 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. 4 units
- Psychology 3 or 102. 4 units
- Biological Sciences 1A or 1B. 4 units
- Biological Sciences 10. 4 units
- Anthropology 1A or 1B. 4 units
- Anthropology 10, 11, 12. 4 units
- Sociology or cultural anthropology. 1 unit

**A.B. Major Requirements:**

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Biology 1A or 1B. 4 units

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Biology 1A or 1B. 4 units

**Depth Subject Matter**

- Psychology 10. 4 units
- Sociology or cultural anthropology. 1 unit

**Total Units for the Major**

- 51-65 units

**B.S. Major Requirements:**

**Biology Emphasis**

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Biology 1A or 1B. 4 units
- Physics 10 or SC-10. 4 units

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Biology 1A or 1B. 4 units
- Physics 10 or SC-10. 4 units

**Depth Subject Matter**

- Psychology 10. 4 units
- Sociology or cultural anthropology. 1 unit

**Total Units for the Major**

- 58-106 units

Recommended: Psychology 154, 180B, 199 (on a psychological topic), Zoology 105, 106, Anthropology 144A, Environmental Studies 110. (Psychology 103 strongly recommended for students who plan to do graduate work in any area of Psychology.)

**Mathematics Emphasis**

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Mathematics 121, 121, 121C. 4 units
- Chemistry 10A-10B, 4 units

**Preparatory Subject Matter**

- Psychology 1 or the equivalent. 4 units
- Mathematics 121, 121, 121C. 4 units
- Physics 10 or SC-10. 4 units

**Depth Subject Matter**

- Psychology 10. 4 units
- Sociology or cultural anthropology. 1 unit

**Total Units for the Major**

- 51-65 units

Recommended for All Majors: Psychology 103 is strongly recommended for students who plan to do graduate work in any area of psychology. It is strongly recommended that Psychology 41 or Statistics 13 be taken prior to enrolling in upper division courses.

**Total Units for the Major**

- 51-106 units

Recommended for All Majors: Psychology 103 is strongly recommended for students who plan to do graduate work in any area of psychology. It is strongly recommended that Psychology 41 or Statistics 13 be taken prior to enrolling in upper division courses.

**Honors and Honors Program:** In order to be eligible for high or high honors in Psychology, the student must both meet the college criteria and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. This project is to be written in thesis form and approved by the department.

**Minor Program Requirements:**

**Psychology**

- Psychology 1 or the equivalent. 4 units
- One course from each of the following three groups. 1 unit

**Recommended:** Psychology 154, 180B, 199 (on a psychological topic), Zoology 105, 106, Anthropology 144A, Environmental Studies 110. (Psychology 103 strongly recommended for students who plan to do graduate work in any area of Psychology.)

**Graduate Study:** The Department offers programs of
study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser, See Class Schedule and Room Directory.

Courses in Psychology

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. (CAN P6 2)

15. Introductory Psychobiology (3) I, II, III. The Staff Lecture—3 hours. Survey of genetic, evolutionary and physiological factors affecting behavior. Emphasis on biological and biosocial mechanisms for understanding people and their interaction with their environment. No credit allowed to students who have completed course 21. General Education credit for two-course sequence of non-GE courses (15-18) which will satisfy requirement for one GE course: Contemporary Societies/Introductions.

16. General Metabolism and Neurobiology (3) I, II, III. The Staff Lecture—3 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 (15-18) which will satisfy requirement for one GE course: Contemporary Societies/Introductions.

23. 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 expository writing and brief presentations.

41. Research Methods in Psychology (4) I, II, III. Mitchell Lecture—4 hours. Prerequisite: course 1 or the equivalent; completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, research techniques, interpretation of results, and statistical analysis. (P/NP grading only)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) Primarily for lower division students. (P/NP grading only)

Upper Division Courses

103. Advanced Research Design and Data Analysis (5) I, II. Kroll, Johnson, Mitchell Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

105. Statistical Inference from Psychological Experiments (4) I, II. Kroll Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Review of basic statistical procedures, hypothesis testing, statistical inference, and nonparametric statistics, with applications in sensory, perceptual, comparative, physiological, and other areas of research.

106. Physiological Psychology (5) I, II, III. Chalupa, Henry, Mendosa Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1; at least one zoology or physiology course recommended. Relationship of brain structure and function to emotion, motivation, perception, states of consciousness, language, learning, and memory in humans and other animals; introduction to methods of physiological psychology.


114. Gender and Social Development (4) III. Shields Lecture—4 hours. Prerequisite: course 1. Biological and social factors that influence when and how psychological states are experienced in human development. Special attention to the scientific and social rationale which underlie the study of gender.

115. Maturity and Aging (4) I, II, III. The Staff Lecture—4 hours. Prerequisite: course 112. Biological, cognitive, personality, and social aspects of the human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

120. History of Psychology (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 1; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science.

125. Sensory Processes (5) I, II, III. Henry, Mendosa Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 121 or Biological Sciences 18 or consent of instructor. Psychobiology of sensory systems in man and other animals. Relationship of behavior to physiology, structure and function of the senses.

126. Human Learning and Memory (4) I, II, III. Kroll, Parks Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and either Statistics 13 or 102 or course 41; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

131. Perception (4) I, II, III. Natsoulas, Parks, Post Lecture—3 hours; independent laboratory work. Prerequisite: course 1. The cognitive organizations related to measurable physical changes mediated through sensory channels. The perception of objects, space, motion, events.

122. Language and Cognition (4) I, II. The Staff Lecture—4 hours. Prerequisite: course 1 or the equivalent, and 6 units of upper division work in psychology or linguistics. Zoological, cultural, and individual perspectives of linguistic actions: their production, perception, cognitive significance, and their roles in human conduct, enunciation, and cognitive development.

134. Animal Learning and Motivation (5) I, II. Coss Lecture—5 hours. Prerequisite: course 1 or 15 or consent of instructor. General theories of phythic differences in learning and motivation drawing upon data from laboratory and field observations. Invertebrates and primate. Motor output and reporting, heart disease, cancer, obesity, and health maintenance and promotion. Application of principles in lab exercise.

160. Health Psychology (4) I, II. Emmons Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, health perception and reporting, heart disease, cancer, obesity, and 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, 168, and either 112 or 145, Major theoretical formulations in the history of clinical psychology, from classical psychanalysis to contemporary existentialism and behavior modification. Survey based on lectures, films, and texts, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II. Emmons, Murphy, Sommer Lecture—4 hours. Prerequisite: course 1. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior.

171. Humanistic and Transpersonal Psychology (4) I, II. Tarte Lecture—4 hours. Prerequisite: course 165 or the equivalent and consent of instructor. Survey, including lectures and demonstration, of humanistic and transpersonal movements in contemporary psychology. Emphasis on theory, data, and techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.

173. Genius, Creativity, and Leadership (4) I, II. Simonton 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/Non-Introductory. Recommended GE preparation: Psychology 15 and 16.

177. Psychobiography and Life History (4). I, III. Elms. Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor. Case-history research as a nonquantitative approach to studying personality. Psychobiological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15 and 16.

180A. Research in General Experimental Psychology (4). II. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: upper division Physiology 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 Psychobiology (4). II, III, I. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychobiology (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). II, II, III. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

183. Organizational Psychology (4). II, III, I. The Staff. Lecture—2 hours; laboratory—4 hours. Prerequisite: introductory psychology course. Survey of interrelationships among psychology, organization, management, and interpersonal dynamics and organizational forms. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, career development, organizational development, and organization—community relations.

190. Seminar in Psychology (4). 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 area.

192. Fieldwork in Psychology (1-6). I, II, III. Harrison Fieldwork—3-18 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervising internship, off- and on-campus, in community and institutional settings. Credit not applicable toward upper division Psychology major requirements of majors. May be repeated once for credit. Limited enrolment. (P/NP grading only.)

197T. Tutoring in Psychology (1-3). 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 6 units. More than 6 units may count toward the Psychology major requirement. (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)

200. Current Research Topics in Psychology (1). The Staff. Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (SU grading only)

201. Research Preceptorship (4). I, II, III. The Staff. Laboratory discussion—6-9 hours. Prerequisite: consent of instructor. (SU grading only.)

205. Advanced Statistical Inference from Psychological Experiments (5). I, Kroll. Lecture—5 hours; project and term paper. Prerequisite: graduate standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

206. Statistical Analysis of Psychological Experiments (4). I. 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.

207. Multivariate Analysis of Correlational Data (4). III. Sminton. Lecture—4 hours. Prerequisite: course 105 or 205. Because the techniques are implemented using statistical software, prior experience with computers is strongly recommended. Competence in basic algebra is assumed. Application of multiple regression, path analysis, factor analysis, and related methods to infer causal models from correlation matrices.

208. Physiological Psychology (4). Chalupa, Henry. Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology, and neurochemistry to an understanding of animal and human behavior.

212. Developmental Psychology (4). II. Acero, Shelsky. 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. 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). III. Chalupa, Henry, Owings. Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology and consent of instructor. A lecture—seminar on selected topics in the fields of sensory psychology and physiology with an emphasis on the biological correlates of sensory processes.

230. Learning (4). Parks, Kroll. 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. Natoules, 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). I, II. Johnson. Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

247. Personality (4). I. 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. Mason. Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

251. Genetic Correlates of Behavior (4). III. Murphy. Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior.


255. Psychology of Consciousness (4). Natoules. Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Theory and research in the psychology of consciousness.

270A-C. Topics in Personality Psychology (4). III. Elms, Emmons, Erickson. Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Critical study of a selected area of personality psychology.

275. Attitude Formation and Change (4). III. Elms. Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Development of attitudes; theories of attitude change; relationships between attitudes and behavior.

290. Seminar (4). I, II, III. The Staff. Seminar—4 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter may vary depending on interests of instructor and students.

298. Group Study (1-5). II, III, III. The Staff. Seminar (SU grading only)

299. Research (2-9). I, II, III. The Staff. Seminar (SU grading only)

299D. Dissertation Research (1-9). I, II, III. The Staff. Prerequisite: consent of instructor. (SU grading only)

Professional Course

300A-300B-300C. The Teaching of Psychology (4-2-4). I, II, III. 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.)

NOTE: For key to footnote symbols, see page 133.
Radiological Sciences
(School of Veterinary Medicine)
Thomas G. Nyland, D.V.M., M.S., Chairperson of the Department
Department Office, 1114 Medical Science 1A
(916-752-0184)

Faculty
Marvin Goldman, Ph.D., Professor
William J. Hornof, D.V.M., M.S., Associate Professor
Philip D. Koblik, D.V.M., M.S., Assistant Professor
Joe R. Morgan, D.V.M., Vet. Med. Dr., Professor
Thomas G. Nyland, D.V.M., M.S., Associate Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
Alain P. Théon, Dr. Med. Vet., Assistant Professor

Part-Time Clinical Faculty
Larry Y. Krei, D.V.M., Associate Clinical Professor
Sam Silverman, D.V.M., Ph.D., Clinical Professor
James Ticer, D.V.M., Ph.D., Associate Clinical Professor

Courses in Radiological Sciences

Upper Division Courses
115. Bioenvironmental Consequences of Nuclear Technology (3) III. Goldman
Lecture—3 hours; field trips to nuclear power stations. Prerequisite: a course in biology. Biophysical implications of radio-nuclides and thermal effluents generated by nuclear technology. Hazards evaluation based on the predictions of the most sensitive physiological response. Offered in odd-numbered years. (Same course as Environmental Studies 115.)

196. Special Study for Advanced Undergraduates
(1-5) I, II, III. Radiology Staff
(PNP grading only)

Graduate Courses
269. Medical Radiobiology (3) III. Goldman
Lecture—3 hours. Prerequisite: Introductory courses in physics, biochemistry, and physiology, or consent of instructor. Biological effects of radiation including genetic, teratogenic, carcinogenic responses in terms of dose and amount. Included are discussions of dose-effect relationship, radiation therapy, environmental radioactivity, and radiation-protection criteria. Offered in even-numbered years.

269. Group Study (1-5) I, II, III. Radiology Staff
(SU grading only)

299. Research (2) I, II, III. Radiology Staff
(SU grading only)

Professional Courses
405. Special Procedures Rounds
(2) I, II, III. The Staff
Discussion—6 hours. Prerequisite: a DVM degree and consent of instructor. 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.)

405. Known Case Conference
(1.5) I, II, III. The Staff
Discussion—1 month. Prerequisite: a DVM degree and consent of instructor. 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
(1.5) I, II, III. The Staff
Lecture—15 hours. Prerequisite: DVM degree or consent of instructor. Fundamentals of radiographic sciences for radiology residents. Topics will include series of in-depth lectures covering the broad spectrum of veterinary radiology/radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (SU grading only.)

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, waterfowls, recreation, and open space.

The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

The field is broad and diverse. Graduates, especially those with some experience, may be employed as consultants, extension specialists, range managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that trainee or apprenticeship experience with that agency be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for national resource management positions.

Job experience, in-service training, and formal education beyond the bachelor's degree may lead to advanced professional positions in research, education, or management.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

Preparatory Subject Matter
(4-6)

Biological sciences (Biology 1A, 1B, 1C) (16)
Chemistry (Chemistry 1A, 1B, 1A) (16)
Computer science (Programming, 21, 31) (16)
Computer science (Engineering) (10) (3)
Economics (Economic principles, 1A) (18) (4-5)
Geology (Geology 1) (11) (4)
Mathematics (Mathematics 16A, 16B recommended) (9-10)

NOTE: For key to footnote symbols, see page 133.
Religious Studies

(College of Letters and Science)

Walen W. Lai, Ph.D., Program Director
Program Office, 922 Sprout Hall (916-752-9932)

Committee in Charge
William Bossart, Ph.D. (Philosophy)
Paul A. Castellano, Ph.D. (Botany)
Marianne F. Collins, Ph.D. (History)
John-H. Hall, Ph.D. (Sociology)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Whalen W. Lai, Ph.D. (Religious Studies)
James J. Murphy, Ph.D. (Religious Studies)
Peter Schaeffer, Ph.D. (German)
Davido T. Traill (Philology)

Faculty
Lincoln D. Hurst, Ph.D., Assistant Professor
Naomi Janowitz, Ph.D., Assistant Professor
Whalen W. Lai, Ph.D., Professor
Barbara Melicoff, Ph.D., Professor (History)

The Major Program
Majoring in Religious Studies provides an opportunity to explore and analyze the written and oral traditions of the world's great religions: Eastern (Hinduism, Buddhism, Taoism, Confucianism), Western (Judaism, Christianity), and Islam, ancient and modern. The program takes a rigorously academic approach to the study of these religions. In addition to studying religious thought per se, students in the major also study how the religions' teachings have shaped the behavior and ethical principles of the cultures in which they exist. This course is designed to analyze the major world religions of China, India, and the West in their historical and cultural contexts as well as in their contemporary forms. Students may choose to major in religious studies to gain an understanding of the religious context of their studies.

Minor Program Requirements:
The following are the minor program options and courses that are available in the Minor Program. The minor program is designed to provide an introduction to the study of religious studies and to enable students to explore the religious traditions of different cultures. Courses are available in a variety of formats, including lectures, seminars, and independent study. The minor program provides a solid foundation for further study in religious studies and is highly recommended for students interested in pursuing a career in religious studies or related fields.

Preparatory Subject Matter

Anthropology 2.......................... \ 4
Religious Studies 1.......................... \ 4
Religious Studies 23 or 60.................. \ 4
Religious Studies 4 or 70.................. \ 4

Total Units for the Major.................... \ 68

Recommended
A reading knowledge of a foreign language is highly recommended. Consult major advisor for a complete list of recommended upper division courses.

Minor Advisers

A.B. Major Requirements:

Preparatory Subject Matter............... \ 28
Anthropology 2.......................... \ 4
Religious Studies 1.......................... \ 4
Religious Studies 23 or 60.................. \ 4
Religious Studies 4 or 70.................. \ 4
Depth Subject Matter.................... \ 40
History 130A, 130B, 130C.................. \ 12
Philosophy 105.......................... \ 4
Anthropology 124 or Sociology 146........ \ 4
Upper division courses in religious studies including 4 units each from Jewish studies, Christian studies, and general religious studies (Religious Studies 100, 110, 115, 150)........... \ 20

Minor Program Requirements:
The following are the minor program options and courses that are available in the Minor Program. The minor program is designed to provide an introduction to the study of religious studies and to enable students to explore the religious traditions of different cultures. Courses are available in a variety of formats, including lectures, seminars, and independent study. The minor program provides a solid foundation for further study in religious studies and is highly recommended for students interested in pursuing a career in religious studies or related fields.

Preparatory Subject Matter............... \ 28
Anthropology 2.......................... \ 4
Religious Studies 1.......................... \ 4
Religious Studies 23 or 60.................. \ 4
Religious Studies 4 or 70.................. \ 4

Total Units for the Major.................... \ 68

Recommended
A reading knowledge of a foreign language is highly recommended. Consult major advisor for a complete list of recommended upper division courses.

Minor Advisers

Religious Studies

(College of Letters and Science)

Walen W. Lai, Ph.D., Program Director
Program Office, 922 Sprout Hall (916-752-9932)

Committee in Charge
William Bossart, Ph.D. (Philosophy)
Paul A. Castellano, Ph.D. (Botany)
Marianne F. Collins, Ph.D. (History)
John-H. Hall, Ph.D. (Sociology)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Whalen W. Lai, Ph.D. (Religious Studies)
James J. Murphy, Ph.D. (Religious Studies)
Peter Schaeffer, Ph.D. (German)
Davido T. Traill (Philology)

Faculty
Lincoln D. Hurst, Ph.D., Assistant Professor
Naomi Janowitz, Ph.D., Assistant Professor
Whalen W. Lai, Ph.D., Professor
Barbara Melicoff, Ph.D., Professor (History)

The Major Program
Majoring in Religious Studies provides an opportunity to explore and analyze the written and oral traditions of the world's great religious traditions: Eastern (Hinduism, Buddhism, Taoism, Confucianism), Western (Judaism, Christianity), and Islam, ancient and modern. The program takes a rigorously academic approach to the study of these traditions. In addition to studying religious thought per se, students in the major also study how the religions' teachings have shaped human behavior within cultures in the family life, ideas of right and wrong, sexual roles and relations, relations between individuals and society, relations between state and society, relations between religion and science, and artistic expression. The student majoring in Religious Studies is offered a broad choice of courses in departments in the College of Letters and Science.

NOTE: For key to footnote symbols, see page 133.
Courses in Hebrew

Lower Division Courses

1. Elementary Classical Hebrew (5.1) 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, the course 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 column, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Classical Hebrew (5.2) I. 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 (5.3) I. 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 and from post-Biblical Hebrew texts. Continuation of course 2.

Courses in Religious Studies

Lower Division Courses

1. Survey of Religion (4) J. Janowit; I. Lai Lecture—3 hours; discussion—1 hour. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.): readings from the Bible, Bhagavad Gita, the Koran, selections from the Buddha writings. General Education credit: Contemporary Societies/Introducory.

2. Myth, Ritual, and Symbolism (4) J. Janowit 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 from a historical and anthropological study of the role of religion. General Education credit: Contemporary Societies/Introducory.

3. Eastern Religions (4) I. Lai Lecture—3 hours; discussion—1 hour. Eastern religious traditions including Hinduism, Buddhism, and Taoism from their origins to the present.

4. Introduction to Religious Studies (2) I, II. The Staff (Chairperson in charge) 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.

5. Cosmology and Culture: Interactions between Religion and Science (4) II. Griswro (Philosophy), Janowit Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in philosophy or religious studies recommended. Interdisciplinary introduction to religious and scientific cosmologies, focusing on their interplay. Primary goal of course is to develop skills in analyzing cultural presuppositions and their fundamental assumptions of religion and science. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any introductory GE course in philosophy or religious studies. (Same course as Philosophy 19A.)
ies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.

186. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing and consent of instructor; P/N/P grading only.

190. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N/P grading only)

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**Renewable Natural Resources**

**See Resource Sciences**

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**Reproduction**

(School of Veterinary Medicine)

George H. Stabenfeldt, D.V.M., Ph.D., Chairperson of the Department

Department Office, 1136 Medical Science I (915-752-1388)

**Faculty**

David M. Baldwin, Ph.D., Associate Professor in Reproduction

Domenico Bernocco, D.V.M., Libera Docenca, Associate Professor

Robert H. BonDurant, D.V.M., Professor

Ann Trommershausen Bowling, Ph.D., Adjunct Professor

Edward C. Feldman, D.V.M., Professor

John P. Hughes, D.V.M., Professor

Bill L. Lesley, Ph.D., Professor in Residence

Irwin K. M. U., D.V.M., Ph.D., Professor

James Murray, Ph.D., Associate Professor (Reproduction, Animal Science)

George H. Stabenfeldt, D.V.M., Ph.D., Professor

Clyde J. Storch, M.D., Professor Emeritus

**Part-Time Clinical Faculty**

Conrad Ferreira, D.V.M., Assistant Clinical Professor

Walter Guterbock, D.V.M., Assistant Clinical Professor

Bob Harmon, D.V.M., Assistant Clinical Professor

Gregory A. Lethem, D.V.M., Assistant Clinical Professor

James R. Howard, D.V.M., Ph.D., Assistant Clinical Professor

Michael G. Kerfoot, D.V.M., Assistant Clinical Professor

Gregory A. Lethem, D.V.M., M.P.V.M., Assistant Clinical Professor

Terry Leeus, D.V.M., Assistant Clinical Professor

Michael McClay, D.V.M., Assistant Clinical Professor

Frank A. Mongini, D.V.M., Associate Clinical Professor

Jack W. Morse, D.V.M., Associate Clinical Professor

Carlos Risco, D.V.M., Assistant Clinical Professor

Frank N. Walton, D.V.M., Assistant Clinical Professor

John E. Zimmerman, D.V.M., Assistant Clinical Professor

**Courses in Reproduction**

**Lower Division Course**

92. Work-Learn Experience in Veterinary Science (1-4) I, II, III. The Staff (Stabenfeldt 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-study experience in reproduction. (P/N/P grading only)

**Upper Division Courses**

111. Immunogenetics and Electrophoretic Techniques (2) I. Bernocco Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100 (or the equivalent), or consent of instructor. Immuno logical and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

192. Work-Learn Experience in Veterinary Science (1-4) 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-study experience in reproduction. May be repeated (P/N/P grading only)

196. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Stabenfeldt in charge) (P/N/P grading only)

**Graduate Courses**

231. Pathophysiology of Mammalian Reproduc- tive Processes (3) III. Stabenfeldt Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning genital function, fertilization, implantation, maternal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in odd-numbered years.

230. 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. (S/U grading only)

292. Current Topics in Reproduction (1) I, II, III. The Staff (Stabenfeldt in charge) Seminar—1 hour. Prerequisite: consent of instructor. Discussion of curing scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (S/U grading only)

296. Group Study (1-5) I, II, III. The Staff (Stabenfeldt in charge)

299. Research (1-12) I, II, III. The Staff (S/U grading only)

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**Resource Sciences**

(College of Agricultural and Environmental Sciences)

**Faculty**

See under departments of Agricultural Economics, Agronomy and Range Science, and Land, Air and Water Resources.

**The Major Program**

The Resource Sciences major is a program of study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, protection, and management. Students who choose this major include those with interest in careers associated with resource utilization and management, as well as those pursuing post baccalaureate, academic, or professional training.

The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. But, at the same time, certain courses are required in the basic physical and biological science areas. An upper division general 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 with the approval of the student's advisor. Considerable care should be taken to insure effective utilization of the flexibility of the major, to meet individual academic and career objectives. In addition, supportive courses are selected to acquire additional knowledge and skills.

Positions now held by graduates in Resource Sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental staff specialists with government agencies, municipalities and private firms. A significant proportion of graduates are involved in management and policy making, with responsibilities ranging from advanced degrees in resources, the environment and related fields.

**B.S. Major Requirements:**

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

**UNITS**

Written/oral expression .................................................. 11-12

Additional English (English 103D, 103E or 104) .......................... 3-4

**Preprofessional Subject Matter**

Atmospheric science (Geography 3 or Atmospheric Science 60) ......... 4

Biological sciences (Biological Sciences 1A-1B, 1C) .......................... 15

Chemistry (Chemistry 1A-1B) .............................................. 10

Computer science (Agricultural Science and Management 21; Computer Science Engineering 10 or 30) .................................................. 6

Environmental quality (Environmental Toxicology 10 or 101) .............. 3-4

Geology (Geology 1 or 50) ................................................... 3-4

Mathematics (Mathematics 16A-16B) ........................................ 6

Physics (Physics 1A-1B, or 5A-5B-5C) for quantitative resource management emphasis) .................................................. 6-12

Other (additional courses in animal and plant sciences, mathematics and physical sciences with advisor's approval) ......................... 6

**Breadth/General Education**

Satisfaction of General Education requirement to include two nonintroductory courses in Agricultural Economics, Environmental Studies, or Geography .................................................. 5-24

**Depth Subject Matter**

Resource Sciences 100 .................................................................. 4

Soil Science 100 .......................................................................... 4

Water Science 100 ....................................................................... 4

Agricultural Economics 147 or 148 ................................................. 3-4

Resource-oriented courses selected with advisor's approval .................................................. 24

Written expression (in addition to college requirement) (English 103D, 103E, 104) ................. 3

Qualitative skills (Agricultural Science and Management 150, Environmental Studies 123, Statistical 106, 108) .................................................. 3-4

Social-political awareness in resource sciences (Environmental Studies 160, 161; Environmental Toxicology 138, Geophysics 161, Geology 134, Water Science 150, Wildlife and Fisheries Biology 151) .................................................. 3-4

Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 100, Plant Science 101, Zoology 129) .................................................. 3-4

Special study or internship (Resource Sciences 190, 192, 198, 199) ......................... 3

**Unrestricted electives** ............................................................. 19-50

**Total Units for the Degree** ...................................................... 160

**Related Courses.** For courses that are related to this major, see course listings for Agricultural Economics, Agricultural Science and Management, Animal Science, Botany, Entomology, Environmental Biology and Management, Environmental Studies, Environmental Toxicology, Geography, Geology, Range Management, Soil Science, Water Science, Wildlife and Fisheries Biology, and Zoology.

**Major Adviser**

(Agronomy and Range Science)
Courses in Resource Sciences

102. Concepts in Renewable Natural Resources (4) II. Walker Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. A survey of renewable natural resources, including relationships among soil, water, air, energy, plants, animals and society. Role of man in resource management, preservation and improvement for provision of food, fiber, environmental enhancement and recreation.

103. Renewable Energy Resource (3) II. Ficocchi Lecture—3 hours. Prerequisite: course 3. Characteristics of solar energy; energy balance of structures; analysis of systems for heating water and air; air conditioning systems; electricity from the sun; biomass conversion; wind power.

104. California by Air (3) III. Walker Lecture—1 hour; discussion—2 hours; laboratory—3 hours. One Friday or Saturday flight; individual study projects as written and oral reports. Prerequisite: course 10 (may be taken concurrently) and one introductory course in geology or a course in physical geography. Issues in use of natural resources; social and environmental effects of using specific resources; analysis of strategies designed to assure continuation of resource availability. ($10 laboratory fee.)


Seminar on Alternatives in Agriculture (2) II. The Staff (Chairperson in charge) Seminar—2 hours. Seminar on alternative points of view regarding agronomic, economic and public policy aspects of current and future agricultural systems. (P/NP grading only.)

92. Resource Sciences Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

99. 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. Concepts in Renewable Natural Resources (4) II. Walker Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. A survey of renewable natural resources, including relationships among soil, water, air, energy, plants, animals and society. Role of man in resource management, preservation and improvement for provision of food, fiber, environmental enhancement and recreation.

106. Agriculture and Wildlife (3) II. Demment Lecture—3 hours; two Saturday field trips. Prerequisite: upper division standing or consent of instructor. Study of the Central California Valley and the Delta region as an example of utilization for production, agriculture, and outdoor recreation—the conflicts and harmonies; lectures by distinguished biologists of the University and the State Department of Fish and Game.

107. Renewable Energy Resource (3) II. Ficocchi Lecture—3 hours. Prerequisite: course 3. Characteristics of solar energy; energy balance of structures; analysis of systems for heating water and air; air conditioning systems; electricity from the sun; biomass conversion; wind power.

110. California by Air (3) III. Walker Lecture—1 hour; discussion—2 hours; laboratory—3 hours. One Friday or Saturday flight; individual study projects as written and oral reports. Prerequisite: course 10 (may be taken concurrently) and one introductory course in geology or a course in physical geography. Issues in use of natural resources; social and environmental effects of using specific resources; analysis of strategies designed to assure continuation of resource availability. ($10 laboratory fee.)


Seminar on Alternatives in Agriculture (2) II. The Staff (Chairperson in charge) Seminar—2 hours. Seminar on alternative points of view regarding agronomic, economic and public policy aspects of current and future agricultural systems. (P/NP grading only.)

92. Resource Sciences Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

99. 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.)

NOTE: For key to footnote symbols, see page 138.
Rhetoric and Communication

Minor Program Requirements:

**COURSES**

1. Introduction to Public Speaking (4) I, II, III. 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 addresses. (CAN Spch 4)

2. Rhetoric in the News Media (4)
   Lecture-discussion—4 hours. Study of rhetorical concepts and processes influencing the news media of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, and group projects on news media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles.

3. Introduction to Advocacy (4) II.
   Pomery.
   Lecture—4 hours. Introduction to the rhetoric of controversy, with emphasis upon the nature of public debate, the analysis of issues, and the logical presentation of evidence in support of arguments. (CAN Spch 6)

4. Communication and the Public (4)
   Lecture—4 hours. Survey of the role of public communication in society, with an emphasis on the impact of mass media on public opinion and public policy. (CAN Spch 7)

5. Contemporary Theories of Human Communication (4) III.
   Lecture-discussion—4 hours. Examination of current theories and models of communication, with an emphasis on the study of contemporary communication practices and their impact on society. (CAN Spch 8)

6. Media Criticism: Broadcast (4)
   Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture.

7. Psychological Aspects of Communication (4)
   Lecture—4 hours. Examination of the role of psychological factors in communication processes, including motivation, perception, and learning. (CAN Spch 9)

8. Oral Communication (4)
   Lecture—4 hours. Study of the principles and techniques of effective speaking, with an emphasis on public speaking, interpersonal communication, and group discussion. (CAN Spch 10)

9. Presentation Skills (4)
   Lecture—4 hours. Study of the principles and techniques of effective presentation, including speaking, public speaking, and audience analysis. (CAN Spch 11)

10. Public Speaking (4)
    Lecture—4 hours. Study of the principles and techniques of effective public speaking, including speech preparation, delivery, and evaluation. (CAN Spch 12)

11. Media Criticism: Print (4)
    Lecture—4 hours. Examination of current theories and models of print media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture. (CAN Spch 13)

12. Rhetoric in the News Media (4)
    Lecture—4 hours. Study of rhetorical concepts and processes influencing the news media of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, and group projects on news media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles. (CAN Spch 14)

13. Contemporary Theories of Human Communication (4) III.
    Lecture-discussion—4 hours. Examination of current theories and models of communication, with an emphasis on the study of contemporary communication practices and their impact on society. (CAN Spch 15)

14. Media Criticism: Broadcast (4)
    Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture. (CAN Spch 16)

15. Psychological Aspects of Communication (4)
    Lecture—4 hours. Examination of the role of psychological factors in communication processes, including motivation, perception, and learning. (CAN Spch 17)

16. Oral Communication (4)
    Lecture—4 hours. Study of the principles and techniques of effective speaking, with an emphasis on public speaking, interpersonal communication, and group discussion. (CAN Spch 18)

17. Presentation Skills (4)
    Lecture—4 hours. Study of the principles and techniques of effective presentation, including speaking, public speaking, and audience analysis. (CAN Spch 19)

18. Public Speaking (4)
    Lecture—4 hours. Study of the principles and techniques of effective public speaking, including speech preparation, delivery, and evaluation. (CAN Spch 20)
standing with a major in Rhetoric and Communication for a minor in instruction. Group study of a special topic in Rhetoric and Communication. May be repeated once for credit. Enrollment limited.

192. Internship in Rhetoric and Communication (1-5) I, II, III. The Staff (Chairperson in charge). 
   Internship—3-18 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Work is under the direction of a faculty member. May be repeated for credit up to 12 units. Units do not count toward major requirements. (P/NP grading only.)

194H. Senior Honors Thesis (4) I, II, III. The Staff (Chairperson in charge). 
   Seminar—1 hour; individual tutoring on research pro- ject—3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty advisor.

197. Tutoring in Rhetoric and Communication (2-4) I, II, III. The Staff (Chairperson in charge) 
   Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in Rhetoric and Communication and consent of Department Chairperson. Tutoring in undergraduate Rhetoric and Communication courses, including leadership in small groups for numerous assignments as well as development of students in small groups. May be repeated for credit up to six units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) 
   Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) 
   (P/NP grading only.)

Graduate Courses
Seniors may take graduate courses with consent of instructor.

210. Contemporary Rhetorical Theory (4) II. Abbott Lecture—4 hours. Prerequisite: upper division course in rhetorical theory/criticism or the equivalent. Rhetorical thought in the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, A.A. Richards, Richard Weaver, Chaim Perelman, and Stephen Toulmin.

212. Perspectives on Rhetorical and Communication Theory (4) I, II. Blythe Seminar—4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Nature and role of paradigms and theories in developing knowledge about communication. Examination of current theoretical perspectives in rhetoric and communication.

214. Mass Communication Theory and Research (4) 
   Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the basic theories, models, and assumptions of mass communication. Reviews the current state of this discipline and major research developments. Special emphasis on research regarding media and violence, women and minorities, political communication, and new technologies.

215. Mass Communication and Social Change (4) I, II. Albery Seminar—4 hours. Prerequisite: course 220 and 214, or the equivalent. To gain an understanding of current theories and concepts in communication and mass communication. To explore the role of mass media in the political process and to examine the social role of media in society.

220. Empirical Methods in Communication (4) II. Molley 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. Prac tium in Rhetorical Criticism (4) Semester—4 hours. Prerequisite: course 120, an equivalent course in criticism, or consent of instructor. Analysis of selected persuasive messages. Particular attention to the rhetorical situation and to elements in the rhetorical process.

240. Advocacy in Contemporary Society (4) III. Primoroyer Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocacy stance. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in even-numbered years.

242. Prospective in Symbolic Behavior (4) Seminar—4 hours. Prerequisite: course 220. Examination of language and/or other symbolic codes in communication. Investigated phenomena may include stylistic variation in speech acts, cognitive processing, communication rules, and audience effects. Offered in even-numbered years.

243. Persuasion Theory (4) III. Lecture-seminar—4 hours. Prerequisite: course 152, 219, or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion theories.

244. Organizational Communication (4) I, II. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

253. Negotiation (4) I, V. Holte 
   Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiation. Offered in even-numbered years.

255. Medieval and Renaissance Rhetorical Theory (4) I. Murphy 
   Seminar—4 hours. Prerequisite: course in ancient Greek and Roman rhetorical. Rhetorical theory from time of St. Augustine (A.D. 430) to end of Renaissance (A.D. 1700). Three medieval rhetorical genres. Rise of universality. Effect of Renaissance humanism, printing, and science. Influence of major theoreticians such as Erasmus, Melanchthon, Ramus, and Bacon.

256. Early Modern Rhetorical Theory (4) Seminar—4 hours. Prerequisite: course in Classical or Renaissance rhetorical. Development of English and continental theories of rhetoric, 1700-1900. Emphasis upon the works of Priestley, Reid, Campbell, Blair, and Whiteh. Special attention to psychological, epistemological, and rhetorical elements. Offered in odd-numbered years.

260. Communication Applications (2-4) I, II, III. The Staff (Chairperson in charge) 
   Discussion—1 hour; supervised field work—3-9 hours. Prerequisite: course 220. Field work in communication. Organization and implementation of a research project as a special application of a communication program. May be repeated once for credit. (S/U grading only.)

299. Thesis Research (1-12) I, II, III. The Staff (Chairperson in charge) 
   Independent study—3-36 hours. Prerequisite: graduate standing in Rhetoric and Communication. (S/U grading only.)

Professional Course

390. Teaching Communication Skills at the College Level (4) I. Molley 
   Lecture—2 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: graduate standing or consent of instructor. Problems and techniques of teaching basic communication skills courses at the college level. (S/U grading only.)

Russian
(College of Letters and Science)
Lawrence J. Grant, M.A., Program Director
Program Office, 422 Sprout Hall (616-752-4171)

Committee in Charge
Robert O. Cummey, Ph.D. (History) 
James Gallant, Ph.D. (Russian) 
Lawrence J. Grant, M.A. (Russian) 
Harriet Murav, Ph.D. (Russian) 
Daniel Rancour-Lafiere, Ph.D. (Russian)

Faculty
Frederick Chick, Ph.D., Visiting Lecturer 
Yuri Druzhkov, Ph.D., Visiting Lecturer 
James Gallant, Ph.D., Associate Professor 
Lawrence J. Grant, M.A., Lecturer 
Harriet Murav, Ph.D., Assistant Professor 
Daniel Rancour-Lafiere, Ph.D., Professor

The Major Program

The department offers a major in which students may elect to complete one of three emphases, depending upon career interest. The common basis for the first two is extensive training in the Russian language. The Russian Literature emphasis concentrates on the evaluation of Russian literary movements and cultural trends. This program prepares students for
graduate study in literature and a career in teaching. The second area of study, the Russian Language emphasis, focuses on linguistics and practical language skills. This program prepares students for graduate work and, in conjunction with a secondary field of study in the social or natural sciences, can lead to a career in government or business. The third area, the Russian Area Studies emphasis, proposes 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 Soviet Union. It is particularly suitable for graduate work in international relations and careers in diplomacy and in international organizations.

A.B. Major Requirements:

Preparatory Subject Matter

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A.A. Area Studies

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A.A. Russian Area Studies

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Courses in Russian

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 1 (5, 6) II. Grant in charge Discussion—5 hours, laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be charged to the student’s P/N option, no credit will be awarded. All students will receive a letter grade unless a P/N option is filed.

2. Elementary Russian 2 (5, 6) III. Grant in charge Discussion—5 hours, laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

3. Elementary Russian 3 (5, 6) III. Grant in charge Discussion—5 hours, laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.

4. Intermediate Russian 1 (4) Grant and staff Discussion—5 hours, laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.

5. Intermediate Russian 2 (4) Grant and staff Discussion—5 hours, laboratory—1 hour. Prerequisite: course 4. Grammar review, introduction to literature.

6. Intermediate Russian 3 (4) III. Grant and staff Discussion—4 hours, laboratory—1 hour. Prerequisite: course 5. Grammar review, continued conversational practice and continued reading of literature.

7. Elementary Conversation (2) I, II, III. The Staff Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and to understand Russian. May be repeated for credit up to a maximum of 6 units.

8. Great Russian Writers (In English) (4) III. Grant:

Survey of Nineteenth-Century Russian Literature (In English) (4) I. Grant:

Survey of Russian History and Culture (In English) (4) III. Grant:

Survey of Russian Cultural and Social History (In English) (4) III. Grant:

Survey of Russian History and Society (In English) (4) III. Grant:

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123. Twentieth-Century Russian Prose (in English) II. Murav
Lecture—3 hours; term paper. Examination of various trends including Acremis, Symbolism, Naturalism, and Socialism in development of prose. Readings from such writers as Gorky, Zamyatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in odd-numbered years.

126. The Russian Theater (in English) III. Murav
Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present. Readings include Turgenev, Tolstoy, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in odd-numbered years.

137. Nineteenth-Century Russian Poetry (in English) I. Rancour-Lafore
Discussion—3 hours; term paper. Prerequisite: course 2. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovsky, Pushkin, Delvig, Baratynsky, Lermontov, Nekrasov, Tютчев, and Fet. Conducted in Russian. Offered in odd-numbered years.

138. Twentieth-Century Russian Poetry (in English) I. Rancour-Lafore
Discussion—3 hours; term paper. Prerequisite: course 2. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Briusov, Blok, Akhmatova, Mandelshtam, Esselmatov, Mayakovsky, Khlebnikov, Pasternak, Evtushenko, Voznesensky, and Brodsky. Conducted in Russian. Offered in even-numbered years.

139. Contemporary Soviet Culture (in English) III. Chocat
Lecture—3 hours; written work. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between the culture and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from GE Literature Preparation List.

141. Tolstoy (in English) (4). I. The Staff
Lecture—3 hours. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. Offered in odd-numbered years.

150. Russian Culture (in English) II. The Staff
Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to the nineteenth century. Russian art, music, philosophy, and traditions, and daily life. Offered in odd-numbered years.

151. Soviet Writers and Censorship (in English) II. Druzhnikov
Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Preparation List or consent of instructor. Literature and censorship in the Soviet Union. Personal responsibility of the author, conformity to state morality, Soviet myths and Soviet realities. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

154. Russian Folklore (in English) III. Rancour-Lafore
Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peoples. Sociological implications of attitudes toward family unit, children, etc. Influences of folklore on Russian literature and historiography. Offered in even-numbered years.

160. Russian Phonology and Morphology (in English) II. Gallant
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word formation. Offered in odd-numbered years.

166. Representations of Sexuality in Russian Literature (in English) I. Rancour-Lafore
Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual, feminist psychoanalytic perspective. Monogamy, free love, exixm, homosexuality, incest, androgyny, and others as depicted by such figures as Pushkin, Gogol, Tolstoy, Dostoevsky, Akhmatova, Blok, Tolstov, and others. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Women's Studies 50 or introductory psychology.

192. Research Essay (2) II, III. The Staff
Prerequisite: a Russian literature course (may be taken concurrently). A research essay based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit.

194H. Special Study for Honors Students (5) II, III. The Staff (Chairperson in charge)
Prerequisite: permission of the instructor. Students guided in conducting independent research leading to an honors paper.

196. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge)
(PRP grading only)

Special Study (Advanced Undergraduates) (1-5) II, III. The Staff (Chairperson in charge)
(PRP grading only)

Graduate Courses

200. Old Church Slavonic (in English) (4). I. Gallant
Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavonic. Offered in odd-numbered years.

202. History of the Russian Language (in English) II. The Staff
Seminar—3 hours; individual reading project—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of Russian literary language. Reading in the original texts from eleventh to eighteenth century. Offered in odd-numbered years.

204. Descriptive Russian Grammar (in English) III. The Staff
Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in even-numbered years.

210A. Style and Syntax (in English) I. Turnes
Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

210B. Style and Syntax (in English) II. The Staff
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 (in English) III. The Staff
Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talk on political, economic, social, and cultural topics, lead and participate in discussions. Conducted in Russian.

220. Old Russian Literature (in English) II. The Staff
Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as The Song of Igor's Campaign, Zadonschina, Epiphany's Lives, Ivan IV's cycle of epistles. May be repeated for credit when different topics are studied. Offered in even-numbered years.

221. Eighteenth-Century Russian Literature (in English) II. The Staff
Seminar—3 hours. Advanced study of literary movements and styles in prose of poetry. The works of writers such as Karitikin, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

222. Nineteenth-Century Russian Literature (in English) I. Rancour-Lafore
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 odd-numbered years.

223. Early Twentieth-Century Russian Literature (in English) I. Rancour-Lafore
Seminar—3 hours. Advanced study of one or more of the modernist movements in Russian literature, including Symbolism, Acremis, and Futurism. May be repeated for credit when different topics are studied. Offered in even-numbered years.

224. Soviet Russian Literature (in English) III. Rancour-Lafore
Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the developments of genres, schools, styles, techniques, and various formal elements. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

266. Group Study (1-5) II, III. The Staff (Chairperson in charge)

269. Research (1-12) II, III. The Staff (Chairperson in charge)
(S/U grading only)

Professional Course

306. The Teaching of Russian (2) I. Grant
Discussion—3 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), 416 Sprague Hall (916-752-2114)
Faculty
Friz Sammen-Frankenegg, Ph.D., Lecturer
(Scandinavian, German)

Courses in Scandinavian

Upper Division Courses
110. Masterworks of Scandinavian Literature in Translation (4). Sammen-Frankenegg
Lecture—3 hours, 3 credits. Readings in English translation from Old and New
Scandinavian literature. May be repeated twice for credit.

111. Swedish Film as Narrative (4). III. Sammen-Frankenegg
Lecture—3 hours (term paper). Swedish films studied as narratives in the cinematic medium and
compared to their literary sources. Offered in even-numbered years.

Courses in Swedish

Lower Division Courses
1. Elementary Swedish (5). I. Sammen-Frankenegg
Discussion—5 hours. Introduction to Swedish gram-
mar and development of all language skills in a cul-
tural context with special emphasis on communica-
tion. Students who have successfully completed
Swedish 1 or 2 in the 10th or 11th grade in high
school may receive credit for this course on a
P/NP grading basis only. A passing grade will be
received if the student's P/NP option is not
required. All other students will receive a letter
grade unless a P/NP petition is filed.

2. Elementary Swedish (5). II. Sammen-
Frankenegg
Discussion—5 hours. Prerequisite: course 1. Contin-
uation of course 1 in the areas of grammar and basic
language skills.

3. Intermediate Swedish (5). I-II. Sammen-
Frankenegg
Discussion—5 hours. Prerequisite: course 2. Com-
pletion of grammar course and continuous practice
of all language skills through cultural texts.

4. Intermediate Swedish (4). I-II. Sammen-
Frankenegg
Discussion—3 hours; weekly reports. Prerequisite:
course 3. Review of grammatical principles by
means of written exercises. Reading and discussion of
modern Swedish literature and nonliterary texts.

6A. Spoken Swedish (1). Sammen-Frankenegg
Discussion—2 hours. Prerequisite: course 2. Conver-
sational practice based on everyday vocabulary
of modern spoken Swedish. (P/NP grading only)

6B. Spoken Swedish (2). I-II. Sammen-Frankenegg
Discussion—2 hours. Prerequisite: course 2. Conver-
sational practice based on everyday vocabulary
of modern spoken Swedish. (P/NP grading only)

96. Directed Group Study (1-3). I-II. III. Sammen-
Frankenegg
Prerequisite: consent of instructor. (P/NP grading only)

99. Special Study for Undergraduates (1-3). I-II.
III. Sammen-Frankenegg
Prerequisite: consent of instructor. (P/NP grading only)

Sociology
(College of Letters and Science)
Lawrence E. Cohen, Ph.D., Chairperson of the
Department
Department Office, 113 Young Hall (916-752-0782)
Advising Office, 139 Young Hall (916-752-0786)
Faculty
Nicole W. Biggart, Ph.D., Associate Professor
(Sociology, Management)
Fred Block, Ph.D., Professor
Lawrence E. Cohen, Ph.D., Professor
James C. Cramer, Ph.D., Associate Professor
Diane H. Felmlee, 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. Hamilton, Ph.D., Professor
Mary Jackman, Ph.D., Professor
(Professor of Political Science, Sociology)
Carole E. Joffe, Ph.D., Professor
Carl J. Jonngersen, Ph.D., Associate Professor
Edwin M. Lenert, Ph.D., Professor
Ernests M. Levins, Ph.D., Professor
John F. Lofland, Ph.D., Professor
Lyn H. Lofland, Ph.D., Professor
Leon H. Mayhew, Ph.D., Professor
Danaloro Messa, Ph.D., Associate Professor
Beatrice M. Penner, Ph.D., Assistant Professor
(Chicane Studies, Sociology)
Bellinda Robnett, Ph.D., Assistant Professor
Julius A. Roth, Ph.D., Professor
John F. Scott, Ph.D., Professor
Judith Stacey, Ph.D., Professor
John T. Walton, Ph.D., Professor
(Anthropology, Sociology)
Diane L. Wolf, Ph.D., Assistant Professor

The Major Programs
Sociology is the study of human society in all its manifestations. Its aim is to discover the process and
structure of human interaction, to identify the main forces that sustain or weaken social groups, and
determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellec-
tual quest for knowledge about the functional nature of things. The Department of Sociology offers two major programs, Sociol-
ogy and Sociology—Organizational Studies. Students selecting the Sociology major may choose one from four options offered within this major: the General emphasis, the Law and Society emphasis, the Social Services emphasis, and the Comparative Studies and World Development emphasis. The General Sociology emphasis also allows students to obtain a broader understanding of the concepts, methods, and theories of sociology. This option is designed for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Students with a special interest in the areas of Law and Society or Social Services may choose a more specialized program of courses and practical experience within the Sociology major. These options are designed to prepare students for careers in such areas as law, corrections, social work or counseling. The Comparative Studies and World Development emphasis provides a sociological perspective on societal and economic changes throughout the world, with a stress on relationships between "developed" and "underdeveloped" soci-
eties. It can prepare students for graduate study or careers in international fields. Students are encouraged to consider the Education Abroad Program for their junior year, especially one in developing
country. The 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 multidis-
ciplinary 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 will be prepared for a variety of careers, 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.

In addition to the above majors and options, the Department of Sociology offers several other pro-
grams and opportunities for undergraduates. These include an honors program, tutelages, voluntary
research assistantships, internships, and membership in the Undergraduate Sociology Student Associ-
ation and the International Sociology Honors Soci-
ety. The department also sponsors an undergraduate research award.

The Department of Sociology sponsors the interdisci-
plinary 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.

For more information on the majors and special pro-
grams, contact the Departmental Advising Office in 139 Young Hall.

Sociology
A.B. Degree Requirements:

General emphasis

Preparatory Subject Matter

Sociology 1, 3, or 4, 46A, 46B (or the equiv-
alent) ........................................... 12-13
Select units from Anthropology 2, 4, 14 .......... 4
Select units from History 3, 4A, 4B, 4C, 8, 12,
9A, 9B, 10, 15, 17A, 17B, 17A .......................................................... 14-17
Select units from Philosophy 5, 14, Political
Science 4 ................................................. 4

Depth Subject Matter

Sociology 126, 140, 165A, 165B, 170, 170A
Select two courses each from two of the fol-
lowing seven clusters and one additional
course from a third cluster ..................... 20
Family, Gender, and Social Interaction
Sociology 122, 127, 131, 132, 143B
Law and Social Services
Sociology 120, 150, 152, 154, 156, 158, 166
Social Conflict and Change
Sociology 122, 123, 141, 142, 143A,
143B, 147, 148, 156, 167, 167B, 161, 162
Race and Ethnicity
Sociology 110, 128, 129, 130, 134, 169
Power and Politics
Sociology 118, 119, 133, 139, 144, 159
Knowledge and Communication
Sociology 124, 125, 146, 173, 175, 176
Methodology
Sociology 103, 106, 169, 192

Total Units for the Major: ........................................... 68-69

Recommended: Sociology 189

Law and Society option

Preparatory Subject Matter

Sociology 1, 3, 46A, 46B (or the equiv-
alent) ........................................... 12
Select units from Anthropology 1, 2, Eco-
nomics 1A, 1B, History 3, 4B, 4C, 17A,
17B, Philosophy 1, 12, 21, 22, 23, Political
Science 1, 2, 3, 4, Psychology 1, 15

Depth Subject Matter

Sociology 155

Total units for Sociology 120, 150
Sociology

152. Select units from Sociology 118, 122, 123, 130, 131, 139, 140, 141, 143A or 143B, 156, 165B, 180A or 180B, 185...12

At least 16 additional units in upper division sociology courses to achieve a minimum of 40 units...16

Total Units for the Major...65-67

(Law and Society option)

Social Services option:

Social Preparatory Subject Matter: 28
Sociology 2, 3, 46A, 46B (or the equivalent)...28

Psychology 1...4

Select units from Afro-American Studies 10, 15; Asian American Studies 1, 2; Chicano Studies 10, 20, Native American Studies 10, 70...28

Depth Subject Matter: 44
Sociology 131, 140, 186...12

Select units from upper division human psychology...4

Select seven courses distributed as specified...28

Social Issues: 28
Sociology 102, 119, 120, 122, 124, 139, 143A, 144, 146, 152, 154, 155, 170...8

Sociology Interaction: 28
Sociology 126, 127, 128, 143B, 148, 157...17

Race and Ethnicity: 28
Afro-American Studies 100; Applied Behavioral Sciences 176; Asian American Studies 110, 111, 150; Native American Studies 112, 124; Sociology 110, 129, 130...4

Gender: 28
Sociology 132, 133...4

Organizational Behavior: 28
Sociology 158, 180A, 180B, 181, 182, 183...4

Methodology: 28
Sociology 103, 106, 169, 192...4

Total Units for the Major...72

(Social Services option)

Comparative Studies and World Development option:

Comparative Studies and World Development: 20
Sociology 126, 140, 165A, 165B, 180A or 180B...8

Additional upper division units in Sociolo...8

Sociology—Organizational Studies: 20
Sociology 192A or 180B, 193A, 193B, 194A, 194B, 195...8

Select units from Agricultural Economics 112, American Studies 125, Applied Behavioral Sciences 162, 163, 164, Economics 100, Political Science 190, 181, 183, 187, Psychology 183, 187, 188, Rhetoric and Communication 134, 136...8

Select units from Anthropology 122, History 174A, 179, 187A, 187B, 194D, Anthropology 122...8

Sociology—Social Welfare: 20
Sociology 185, plus 4 units selected from Sociology 131, 140, 152...8

Four units from Sociology 143A or 143B, 156, 165B, 180A or 180B...4

Additional upper division units selected...8

Science 138, 148A, 148B, Religious Studies 168, 172, Sociology 147...8

Total Units for the Major...78-105

(Comparative Studies and World Development)

SOCIETY—ORGANIZATIONAL STUDIES

A.B. Degree Requirements:

Preparatory Subject Matter: 22
Sociology 1, 46A...9

Economics 1A, 1B...10

Mathematics 1A...3

Recommended: Sociology 40 or Computer Science Engineering 10, Mathematics 16B, 16C...3

Depth Subject Matter: 44-45
Sociology 180A, 180B...8

Sociology 103...4

Sociology 106 or the equivalent...4

(Note prerequisite: Sociology 46B or Statistics 13)

Economics 100 or Agricultural Economics 100A...4-5

Units from Anthropological Sciences 162, 163, 164, Agricultural Economics 112...4

Units from History 174A, 179, 187A, 187B, 194D, Anthropology 122...4

Units from Political Science 180, 181, 183, 187, 188...4

Units from Psychology 183, Rhetoric and Communication 134, American Studies 125...4

Units from Sociology 118, 139, 141, 156, 159, 175, 181, 183, 192...8

Total Units for the Major...56-67

Minor Advisers: Consult the Departmental Advising Office, 139 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 Advisers: Consult the Departmental Advising Office, 139 Young Hall.

Courses in Sociology

1. Introduction to Sociology (5) I. Hackett; III. The Staff

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. (CAN Soc 2)

2. Self and Society (4) I. 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/Introductory. (CAN Soc 2)

3. Social Problems (4) I. L. Lofland; II. Robnett

Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. General Education credit: Contemporary Societies/Introductory. (CAN Soc 4)

25. Sociology of Popular Culture (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Social mechanisms that shape modern popular culture. High, folk, and mass culture; the emergence of popular culture. Media mass, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in popular music, street art, television, and advertising. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2 or Anthropology 2.

46. Computers and Social Research (2) The Staff

Lecture—2 hours, exercises. Prewritten: priority to social and behavioral science majors. Elementary introduction to the use of computers in the social sciences. Topics include use of computer programs such as SPSS and MINITAB, data preparation and elementary analysis, and simulations and games. No prior knowledge of FORTRAN or statistics necessary. Those who have had Engineering 5 can receive only 1 unit of credit for Sociology 40. (P/NP grading only)

46A. Introduction to Social Research (4) I. 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. Feinleis

Lecture—3 hours; discussion—1 hour or term paper or research project. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

NOTE: For key to footnote symbols, see page 133.
98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

123. Evaluation Research Methods (4) II. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 3; upper division standing or consent of instructor; course 140 or 156 recommended. Sociological analysis of environmental problems in advanced industrial societies; typology of problems and their causes; population growth and affluence; social class, life styles, and the environmental movement; impacts of environmental changes on social institutions and structures. e.g., family, economy, stratification.

130. Evaluation Research Methods (4) II. The Staff Lecture—3 hours; discussion—1 hour or field research (decided by instructor each term course offered). Prerequisite: course 46A and 46B, or Statistics 13, or the equivalent. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical methods, procedures, and mathematical models especially relevant to sociological analysis.

137. Seminar in Sociological Analysis (4) I. Jorgensen Seminar—3 hours; to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.

110. Sociology of Chicanos (4) I. Pasqua Lecture—3 hours; term paper. The Chicano experience in the American society and economy viewed from the perspective of social changes, invigoration, history, and philosophy of Chicanos; the Chicanos in the American context; education, inequality, ethnicity, the family, and Chicano politics. Offered in even-numbered years.

140. Political Sociology (4) J. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions, the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

119. Peace-Process Institutions (4) II. J. Lofland Lecture—3 hours; discussion—1 hour or term paper or research project. Comparative analysis of institutions and organizations involved in issues of international war and peace; focus on American institutions, including, on the one side, the Department of Defense and on the other, major organizations of the peace movement. General Education credit. Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2.

212. Deviation and Society (4) I. Majlesi Lecture—3 hours; discussion—1 hour or term paper or research project. Theory and studies of deviation in relation to societal reaction, group processes and social change, and social control. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

212. Sociology of Adolescence (4) II. Scott Lecture—3 hours; discussion—1 hour or term paper or research project. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural process.

123. American Society (4) II. Scott Lecture—3 hours; discussion—1 hour or term paper or research project. The demographic and social structure of American society and population, with emphasis on selected processes and factors of special concern. Analysis of social processes as bases for political and economic interest. Attention to selected current social controversies.

124. Sociology of Education (4) III. Scott Lecture—3 hours; term paper or discussion—1 hour (instructor's option). Education and the social structure. Class size, curriculum, and economies of scale. Relations between families and schools in socialization, familial ascription and educational achievement. Education and industrialization. Organizational and occupational structure of schools. Discussion of selected controversies. Attention to selected current social issues.

125. Sociology of Intellectual Life (4) The Staff Lecture—4 hours. Sociology of the intelligentsia: types of intellectuals, theories concerning their social role; research on the social circles of intellectuals. The influence of intellectuals on public policies. The academic social structure. Approaches to the understanding of social meaning, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis.

127. Sociology of Death (4) III. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Analysis of the social structure of aging, death and dying, and death rituals and to death rituals in various cultures.

128. Interracial Intersocial Dynamics (4) I. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). An analysis of the social structure of aging, death and dying, and death rituals and to death rituals in various cultures.


130. Race Relations (4) III. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or research project. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on problems within the U.S.

131. The Family (4) I. Stacey Lecture—3 hours; discussion—1 hour. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation.

132. The Sociology of Gender (4). Feinman; II. Robnett Lecture—3 hours; discussion—1 hour. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society. The functional and comparative perspective. Offered in odd-numbered years.

133. Sexual Stratification and Politics (4) Stacey Lecture—3 hours; discussion—1 hour. Prerequisites: course 132 or the equivalent or consent of instructor. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theories of sex roles. Feminism. J.S. Mill, de Beauvoir, Julia Mitchell, D. Dinnenmayer. Attention to selected issues in social movements for and against sexual equality.

134. Sociology of Racial Ethnic Families (4) III. Pasqua Lecture—3 hours; discussion—1 hour or term paper. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are coordinated in relation to socio-historical dynamics. Offered in odd-numbered years.

139. Corporations and Society (1) Block Lecture—3 hours; research project. The study of the history and power of the modern corporation: corporate organization, politics, the state, and the corporation: labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism.

140. Social Stratification (4) III. Hackett Lecture—3 hours; discussion—1 hour or term paper or research project. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries.

142. Sociology of Transportation (4) Scott Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transportation. Consequences of mass transportation on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

143A. Urban Society (4) I. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization, counterurbanization and the neighborhood change. Consideration of competing theories of urban growth and changes and competing visions of the urban future. Offered in even-numbered years.

143B. Sociology of City Life (4) I. L. Lofland Lecture—3 hours; discussion—1 hour or term paper or research project (instructor's option). Prerequisite: course 1 or the equivalent; course 143A recommended. Critical dissection of the "loss of community" issue. Analytical organization, social changes, and the city of the culture of urban public life and of the learning of city skills. Offered in odd-numbered years.

144. Agriculture and Society (4) Walton, Wolf Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisites: advanced standing in the social sciences or one year of course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor.

NOTE: For key to footnotes symbols, see page 133.
**Sociology**

force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. Offered in even-numbered years.

145A. Sociology of Third World Development (4) I. Wolf
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural-urban migration, 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 (4) III. Wolf
Seminar—4 hours. Prerequisite: course 1; upper division standing. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. Offered in even-numbered years.

146. Sociology of Religion (4) Hall
Lecture—3 hours; discussion—1 hour or term paper or research project. Relationship between social structures and religions. The social setting of the major world religions. Religious innovations and institutionalization. Secularization in the modern world and the rise of secular ideologies. Offered in even-numbered years.

147. Sociological Perspectives on East Asia (4) II. Hughes
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 odd-numbered years.

148. Collective Behavior (4) The Staff
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1 or the equivalent. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panic, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivification gatherings, crazes, fads, and fashions.

149. Religion and American Society (4) III. Hall
Lecture—3 hours; class project. Historical, contemporary, and survey courses on religion 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 and social institution, religion, politics, and social stratification. Offered in even-numbered years.

150. Criminology (4) I. Cohen
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 the causes and implications of delinquency.

154. Sociology of Health Care (4) II. Roth
Lecture—3 hours; discussion—1 hour or term paper or research project. Overview of sociological research in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.

155. Sociology of Law (4) II. Melossi
Lecture—3 hours; discussion—1 hour or term paper or research project. Law considered as social control. Rationalization of the law and its effect on the society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reforms.

156. Social Movements (4) II. I. 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. Frequent use of sound and film materials.

157. Social Conflict (4) III. J. Lofland
Lecture—3 hours; discussion—1 hour or term paper or research project. Analysis of the causative, dynamics, and regulation of social conflict within and between various kinds of social groups with particular reference to nonvoting status groups, intergroup conflict. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2 or Sociology 3.

158. Consumer-Vendor Relationships (4) III. Roth
Lecture—3 hours; discussion—1 hour or term paper or research project. Examination 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 institution of status; occupational collectives and client relationships; occupational social controls; career lines, and occupational-related self-definition; management roles.

160A. 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.

160B. Sociological Theory (4) II. Block
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 the United States. Schools discussed will include functionalism, symbolic interactionism, exchange theory, and ecology.

169. Research in the Chicano Community (4) III.
Lecture—3 hours; research project. Prerequisite: course 46A. Problems of understanding the Mexican-American in various types of social settings; how to conduct social research in such settings. Conceptual and data gathering problems particular to this area of study. Students will develop research and analysis of data.

170. Population (4) I. Craner
Lecture—3 hours; discussion—1 hour or term paper or research project. An introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographic distribution, migration, socio-psychological factors affecting fertility.

173. Sociology Through Literature (4) Walton
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc. Offered in odd-numbered years.

175. Sociology of Mass Communications (4) The Staff
Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Prerequisite: course 1 or the equivalent. Examines the relationship between the media and social structures. History of media-state relations. Media as reflector and shaper of values. Emphasis is on current European, Marxist and pluralist theories and the content analysis of mass media. Offered in even-numbered years.

176. Sociology of Knowledge (4) Hackett
Lecture—3 hours; discussion—1 hour or term paper or research project. Critical analysis of the social foundations of knowledge. The history, problems, and dilemmas in classical sociology of knowledge. Contemporary applications. Natural and social sciences as social systems. Sociology of personal knowledge in everyday life. Offered in odd-numbered years.

180A. Complex Organizations (4) II. Hamilton
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1; Economics 1A and 1B recommended. Develops a sociological approach to organizations theory. Designed to introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis.

180B. Complex Organizations (4) III. Hamilton
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1B or consent of instructor. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on reactions between organizations and the effects of those relations in both the public and private sectors.

181. Social Change Organizations (4) J. Lofland
Lecture—2 hours; discussion—1 hour or term paper or research project. Prerequisite: upper division standing or completion of course 1. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations. Interest groups and citizen groups. Topics treated include formulation, decision-making and leadership, strategies and tactics, factionalism and coalitions, effectiveness.

182. Experimental and Utopian Communities (4) III.
Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian settlements and communitarian movements, including contemporary and other small settlement forms: villages, neighborhoods, monasteries, encampments and nonsettlement communities based on occupation, ethnicity, and religion.

183. Comparative Organizations (4) II. Biggart
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or 180B; upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development. Societies may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in even-numbered years.

185. Sociology of Social Welfare (4) III. Jones
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociology of the evolution and current organization of welfare functions in modern society.

189. Social Science Writing (4) I. Jorgensen
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 46A, upper division standing, and 12 units of social science. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing.

192. Internship and Research Practicum (2-12)
Internship—3-33 hours; discussion—1 hour. Prerequisite: upper division standing; course 46A; approval of the department. Supervised internship and study in an agency, organization, or the application of core cocepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units may be counted toward the Sociology major. (P/N grading only.)

194A-194HB. Special Study for Honors Students (4-4)
I. The Staff
Seminar—3 hours; term paper. Prerequisite: senior standing and admission by petition. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty advisor. ( Deferred grading only pending completion of course sequence.)

197. Tutoring in Sociology (1-4)
I. II. III. The Staff
Tutorial—3-12 hours. Prerequisite: upper division.

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**NOTE:** For key to footnote symbols, see page 133.
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.)

106. Directed Group Study (1-5) I, II, III. The Staff (Hamilton in charge) Prerequisite: consent of instructor. (P/NP grading only.)

108. 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

207A-207B. Methods of Quantitative Research (4-4) II-III. Cohen, Felmine Lecture—3 hours; paper. Prerequisite: course 106 or the equivalent. Principles of study design, examination of measurements, 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) I. Block Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and methods 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 topics such as law and social control, agency contacts and exploratory research projects.


225. Sociological Social Psychology (4) 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 representational theories to historical and contemporary works.

230. Ethnic (Race) Relations (4) II. Jorgenson Lecture—3 hours; paper. Advanced study of the determinants of ethnic groupings and their interrelations. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research.

234. Gender, Family, and Society (4) Stacey Seminar—3 hours; seminar paper. Prerequisite: graduate standing or consent of instructor. Major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalism, Marxian, psychoanalytic, feminist and critical theoretical approaches to these subjects (e.g., Engels, Parsons, Freud, Honkoven, Goode, Lasch, Mitchell). Emphasis on macro and historical questions.

242A-242B. Comparative Methods in Historical Sociology (4-4) II, III. Goldstone Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relation of psychological and sociological research to historiography: the interpretability of historically grounded hypothesis; the meaning of analogy, correspondence and causality. (Deferred grading only, pending completion of sequence.)

243. Urban Society (4) L. Lofland Seminar—3 hours; paper. Broad overview of the issues and concepts 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 familiarization 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 dependence and internal development. Analysis of the global political economy. Offered in even-numbered years.

248. Social Movements (4) J. Lofland Seminar—3 hours; paper. Analysis of current issues in and implications of collective behavior and social movements. Special 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 methods directed to health care issues. Students select topics for supervised research. 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.

264. Proseminar in Sociology (4) I. Stacey Seminar—4 hours. Prerequisite: limited to first year Sociology graduate students. Introduction to sociological concepts at an advanced level. Subjects include culture, social interaction, stratification, deviance, demography, collective behavior, organizations and other topics in which the department offers further specialized work. Various approaches to sociological analysis are examined.

265. Sociological Theory (4) II. Hall Lecture-discussion—3 hours. Prerequisite: courses 165A, 165B, or consent of instructor. The emergence of sociological thinking as part of the history of ideas; the applications and analysis to sociological ideas. The French sociological tradition from Saint-Simon to Durkheim, the influence of Marxist thinking on subsequently sociological ideas.

270. Social Demography (4) Kramer Seminar—4 hours. Prerequisite: course 120 or consent of instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphasis on 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—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military, and economic systems.

290. Seminar (4) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours; term paper. (SU grading only.)

291. Information and Society: A Pracitcum in Information Retrieval (2) Winter seminar—2 hours to core reference and research materials in sociology and related social science fields. Sheds Library material will be used, but local orientation is a secondary emphasis. Main emphasis will be on standardized works and how researchers can use them. (SU grading only.)

292A-292B. Field Research (4-4) III-IV. Wolf Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of instructor. The process of collecting, analyzing and reporting qualitative social data through intensive interviewing, participant-observation and document analysis; generating, developing, and evaluating analytic frameworks; recording, storing, retrieving, and writing up qualitative data; development of principles for each participant completes a field work project. (Deferred grading only, pending completion of sequence.) Offered in odd-numbered years.

299. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Soil and Water Science

(College of Agricultural and Environmental Sciences)

The Major Program

Soil and Water Science is concerned with the use and protection of our land and water resources. The major is designed to provide preparation for advanced degrees in Soil Science or Water Science or for a career involving these resources as well as for a more general interest in resource use and protection. Programs are designed to include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, general soil science, and general water science. (For example, the emphasis on water quality would include more than the minimum number of units in physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.) The flexibility of this major makes possible a wide variety of career opportunities which includes managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, state, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

B.S. Major Requirements:

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

UNITS

Written/Oral Expression ............................11-12
Written expression (see College require-.............7-8
ments) ............................................
Oral expression (Rhetoric 1) .......................A
Preparatory Subject Matter ..........................74
Biological sciences (Biology Sciences 1A, 1B, 1C) ..................15
Chemistry (Chemistry 1A-1B-1C and a .........15
more advanced course).........................
Computer science (Agriculture and Sci- .....A
ence Management 21, Engineering .........6
Economics 2 and 3) ...............................3
Ecological economics 1A, 1B) ...................5
Geology (Geology 50) ............................3
Mathematics (Mathematics 16A, 16B) .........6
Physics (Physics 5A-5B-5C) .....................12
Statistics (Statistics 13, Agricultural, Science ....4
and Management 150) .......................10
Additional physical sciences, biological sci- .....8
ences, and/or mathematics with approval of adviser

NOTE: For key to footnote symbols, see page 133.
Breadth/General Education

15-33

Satlsfication of General Education requirement.

At least one upper division course from each of the following areas, with approval of advisor:

(1) resource management, (2) environmental law, (3) environmental economics and decision making.

 Depth Subject Matter

30

Soil Science 100.................4

Water Science 100.................4

Additional upper division units in soil science and water science...........22

Restricted Electives

27

To supplement or expand areas of student interest selected with approval of advisor.............24

Special study or experience (192 or 198 course in the major area)..................9

Unrestricted electives

9-28

Total Units for the Degree

180

Specific Courses of Instruction.

For specific courses of instruction in this major, see course listings under Atmospheric Science, Plant Science, Resource Sciences, Soil Science, and Water Science.

Major Advisor: J.W. Biggar (Land, Air and Water Resources).

Advising Center for the major is located in 122 Hoagland Hall (916-752-1669).

Graduate Study.

Graduate programs are available in Soil Science as well as Water Science. Detailed information can be obtained from the Graduate Advisor and the Graduate Announcement. See also the Graduate Division section in this catalog.

Related Courses.

See courses in Agricultural Economics, Agricultural Science and Management, Agronomy, Botany, Chemistry, Engineering, Agricultural Engineering, Civil, Environmental Studies, Environmental Toxicology, Geology, International Agricultural Development, Range Science, and Vegetable Crops.

Lower Division Courses

10. Concepts of Soil Science (3)

I. Danigren, Zasoski Lecture—3 hours; optional Saturday field trip. Not open to students who have received credit for course 100 or similar introductory soil science course. Students in baccalaureate programs formed to explore interactive environmental processes; their response to use and management; taxonomic and capability classifications; conservation practices for preservation of soil resources. Intended for students with diverse interests and backgrounds.

92. Soil Science Internship (1-12) II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

106. Principles of Soil Science (4) I. Munro

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1A, and consent of instructor; Geology 50, Biological Sciences 1C, Microbiology 2, and Chemistry 8A recommended. Properties, properties and behavior of soils. Nature and interactions of solids, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soil development and geographic variation, and conservation.

102. Soil and Water Chemistry (5) II. Burau

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth science or consent of instructor. Chemical nature of the mineral and organic constituents of soil and of the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soils.

105. Field Studies of Soil Resources (8) Extra-sess.

son summer. Danigren, 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) I. Rolston

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent preparation in 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 transformation 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. Geomicrobiology (4) II. Scow

Lecture—3 hours; laboratory—3 hours. Prerequisite: general chemistry and an introductory course in biology. Major groups of microorganisms in the geosphere and their responses to environmental variables. Activated carbon relations to water pollution, solid waste disposal, pesticide degradation, and soil fertility.

118. Soils in Land Use and the Environment (4) III.

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 on soils and soil reclamation.

120. Soil Genesis, Morphology, and Classification (5) III. Southard

Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100 and Geology 1; or consent of instructor. Recognition and description of structural, textural, and physical processes of soil formation, including soil-affected soils; factors of soil formation; and introduction to soil classification with emphasis on soil taxonomy.

123. Soil Taxonomy (3) II. The Staff

Lecture—3 hours; discussion—1 hour; laboratory—3 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 classifying soil individuals with emphasis on evaluating their placement in the system. Offered in even-numbered years.

130. Soil and Plant Tissue Testing (3) III. Zasoski

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 109, upper division crop production course, and consent of instructor. Philosophy, conduct, and use of soil and plant tissue analysis in management of soil fertility, in diagnosis of crop nutritional program, and in crop quality assessment.

192. Soil Science Internship (1-12) II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 64 units and consent of instructor. Work-experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

Graduate Courses

207. Transport Processes in Soils (3) III. Rolston


208. Soil-Plant Interrelationships (3) III. The Staff

Lecture—3 hours; laboratory—6 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 and plant characteristics; nutrient assimilation and crop quality.

211. Soil Microbiology (2) II. Scow

Lecture—2 hours. Prerequisite: Chemistry 8B, course 102, or consent of instructor. Activities of some important groups of soil microorganisms; metabolism of organic substances in soil including pesticides; influence of microbial activities on soil properties, microbial activities in soil in relation to some environmental problems.

214. Soil Mineralogy (5) III. Danigren

Lecture—3 hours; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the common minerals in soils and rocks. Weathering reactions and stability of minerals in the weathering environment. Application of analytical methods in mineral analysis, including x-ray, microscopic and chemical analysis for characterization of mineral systems. Offered in odd-numbered years.

215. Physical Chemistry of Soils (5) III. Burau

Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, or consent of instructor. Properties of colloidal and surface aspects of the soil system. Offered in even-numbered years.

218. Soil Erosion and Conservation (3) III. Singer

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing, courses 116, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed.

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 the graduate advisor and the Graduate Announcement. See also the Graduate Division section in this catalog.

Graduate Advisor: M.J. Singer, (Land, Air, and Water Resources).

Courses in Soil Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (916-752-1669).

NOTE: For key to footnote symbols, see page 130.
Soil Science (A Graduate Group)

Dennis E. Rolston, Ph.D., Chairperson of the Group
Group Office, 122 Hoagland Hall (916-752-1669)

Graduate Study. The Graduate Group in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. Consult the Group Office.

Spanish

(College of letters and Science)
Germán Gutiérrez, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)

Faculty
María E. Altisent, Ph.D., Associate Professor
Sanfelipe Armstead, Ph.D., Professor
Donald G. Castaner, Ph.D., Professor Emeritus
Angie C. Chabrain, Ph.D., Assistant Professor
Gonzalo Díaz-Migoyo, Ph.D., Professor
Zunilda Geral, Ph.D., Professor
Mario González, Ph.D., Lecturer Emeritus
Germán Gutiérrez, Ph.D., Professor
Didier S. Jafin, Ph.D., Professor
Daniel S. Keller, Ph.D., Professor Emeritus
Amerindio E. Ojeda, Ph.D., Assistant Professor
Fabián A. Samaniego, M.A., Senior Lecturer
Antonio Sánchez-Romeralo, Ph.D., Professor
Robert M. Scarl, Ph.D., Professor
Mellor Torrelablanc, Ph.D., Professor
Hugo J. Verani, Ph.D., Professor

Faculty
Raquel Machado, Visiting Lecturer (Portuguese)

The Major Program

The major in Spanish is designed to develop competence in the spoken and written language and to provide the possibility of emphasis either on language or literature, depending upon each student's professional goal. The program, alone or in combination with other major programs, may lead to advanced study of the language or literatures 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. Spanish majors are strongly encouraged to complement their work in the department through courses in related areas such as Chicano studies, international relations, linguistics, comparative literature, art, history, and philosophy.

A.B. Major Requirements:

Preparatory Subject Matter

Spanish 1 or 1AF, 2 or 2AT, 3 or 3AF, 4 or 7A, 5 and 6 or 7B, and 28.............0-33

Depth Subject Matter

Spanish 100...........................................3
Spanish 103A or 103B..............3
Spanish 110A or 110B..............4
Spanish 131.................................3
Spanish 132.................................3
Additional upper-division units to be selected as follows:..........................0-24

Plan 1: Spanish Literature Emphasis
Spanish 194...........................................4
Spanish 104A-104B.....................4
Three electives in literature (at least one must be in Spanish-American literature)...........12

Plan 2: Spanish-American Literature Emphasis
Spanish 135 or 136.....................4
Spanish 105A-105B.....................3
Three electives in literature (at least two must be in Spanish-American literature)...........12

Plan 3: Chicano Literature Emphasis
Spanish 124...........................................4
Spanish 126A-126B-126C.............12
Spanish 129 or 135.....................4
One course from Spanish 105A-105B, 106A-106B, 137.....................4

Plan 4: Spanish Language Emphasis
Spanish 133...........................................3
Spanish 134, 135, or 136.............4
Spanish 137.................................4
Three electives (at least one must be in literature).........................................12

Total Units for the Major..................................................45-79

Minor Program Requirements:

Portuguese

Portuguese 101A or 101B..................24
Portuguese 103A-103B.....................8
Portuguese 108.................................4
Portuguese 109A or 109B..............4
One course from Portuguese 114, 115, 116, 117, 118.....................4

Spanish

Spanish 100...........................................3
One course in Hispanic literature (any course)...........................................4
One course in culture from Spanish 134, 135, 136.................................4
One course in advanced composition from Spanish 110A, 110B.....................4
One course from Spanish 131, 132, or 133.....................3-4
Two elective courses acceptable for the Spanish major chosen in consultation with a major adviser (up to 7-8)

For the Spanish major, students may select from the courses in the major program in consultation with a major adviser. The major requirements, including the two elective courses, will be required of all Spanish majors.

Teaching Credential Subject Representation. The student must have at least one course in Spanish and one course in Portuguese taken at the A.B. degree in Spanish, or the equivalent. Candi-
dates will be recommended for admission to graduate study after meeting the requirements of the Graduate Division and the Department of Spanish. Detailed information may be obtained by writing to the Chairperson of the 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, H. Verani.

Courses in Portuguese

Lower Division Courses

1. Elementary Portuguese (5). II. The Staff

Discussion—1 hour; laboratory—1 hour; recita-
tion—1 hour; Portuguese grammar; conversation, and reading. (Students who have successfully com-
pleted a C or better, Portuguese 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 Portuguese (5). II. The Staff

Discussion—1 hour; laboratory—1 hour; recita-
tion—3 hours. Prerequisite: course 1 or consent of instructor. Continuation of course 1.

3. Elementary Portuguese (5). II. The Staff

Discussion—1 hour; laboratory—1 hour; recita-
tion—3 hours. Prerequisite: course 2 or consent of instructor. Continuation of course 2.

4. Intermediate Portuguese (5). III. The Staff

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 3 or the equivalent, or consent of instructor. Readings, class discussions, and analysis of texts to enhance the students' command of the structures and categories of Portuguese grammar.

5. Intermediate Portuguese (5). III. The Staff

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 4 or the equivalent, or consent of instructor. Continuation of course 4, focusing on Luso-Brazilian narrative, drama, expository prose, and poetry. In-depth study of syntax with emphasis on the verbal tenses and moods.

Upper Division Courses

101A. Advanced Grammar and Composition (Portuguese) (4). II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent, or consent of instructor. Readings, class discussions, and written analyses of Portuguese essays and articles. Offered in even-numbered years.

101B. Advanced Grammar and Composition in Portuguese (4). II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent, or consent of instructor. Continuation of course 4, focusing on Luso-Brazilian narrative, drama, expository prose, and poetry. In-depth study of syntax with emphasis on the verbal tenses and moods.

103A. Survey of Portuguese Literature (4). II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 5 or the equivalent. Historical survey of the important periods of Portuguese literature: Medieval, Classic, and Baroque. Offered in odd-numbered years.

103B. Survey of Portuguese Literature (4). II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 5 or the equivalent. Historical survey of the important periods of Portuguese literature: the sixteenth century, Romanticism, modern realism, Modernism, and the Contemporary period. Offered in odd-numbered years.

106. Survey of Brazilian Literature (4). III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Colonial period of Brazilian literature: Baroque, Romanticism, Realism, Sym-
bolism, Modernism. Modern trends in fiction and poetry. Offered in even-numbered years.
108A. Culture and Civilization of Portugal and Brazil (4). I. Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in even-numbered years.
108B. Culture and Civilization of Portugal and Brazil (4). II. Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in odd-numbered years.
114. Luis de Camões (4) III. The Staff
Lecture—3 hours; discussion—3 hours. Prerequisite: course 5 or the equivalent. Lyricism of Camões including the themes, language and style of the "redondelas". "Medida nova" poetry. Sources, characteristics, content and meaning of the Camões "Os Lusíadas". Offered in even-numbered years.
115. Brazilian Novel of the Twentieth Century (4) I. The Staff
Discussion—4 hours. Prerequisite: course 5 or the equivalent. Reading Brazilian literature from the late nineteenth century to the present. Machado de Assis, Aluísio de Azevedo, Graciliano Ramos, Lins do Rio, Jorge Amado and Eric Verissimo. Offered in even-numbered years.
116. Modern Portuguese Poetry (4) III. The Staff
Discussion—4 hours. Prerequisite: course 5 or the equivalent. The "Orpheu" group of poets with emphasis on anguish and narcisism in décor de Sá Carneiro; Fernando Pessoa and his heteronomous creations Alberto Caetelo, Alvaro de Campos, and Ricardo Reis. Offered in even-numbered years.
117. Modern Brazilian Poetry (4) II. The Staff
Discussion—4 hours. Prerequisite: course 5 or the equivalent. Contemporary poetry of Milton de Andrade, Oswald de Andrade and Manuel Bandeira, considered as the leading exponents of the so-called "Movimento de 22". Offered in even-numbered years.
118. Modern Portuguese Prose Fiction (4) III. The Staff
Lecture—1 hour; discussion—3 hours. Prerequisite: course 5 or the equivalent. Neo-realism to existentialism in the twentieth century novel of Alves Redol, Gomes Ferreira, Carlos de Oliveira, Fernando Namoia, Vergilio Ferreira. The original contributions of Bento Bitencourt. Offered in even-numbered years.
199. Special Study for Advanced Undergraduates (1-5) I., II., III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only)

Courses in Spanish

Lower Division Courses
1. Elementary Spanish (5) I., II., III. The Staff
   (Saramiego 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 communication. (Students who have successfully completed, with a C- or better, 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.)
1AATA-1ATB-1ATC, Individualized Instruction in Elementary Spanish (1-2-2)-I-II-III. (Saramiego in charge)
The four segments of course 1A correspond to course 1. Student-instructor contacts consisting of individual tutoring conversation practice and testing periods. (Students who have successfully completed, with a C- or better, 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
   (Saramiego in charge)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.
2ATA-2ATB-2ATC. Individualized Instruction in Elementary Spanish (1-2-2)-I-II-III. (Saramiego in charge)
Prerequisite: course 1 or 1AATA-1ATB-1ATC. The three segments of course 2AT correspond to course 2. Student-instructor contacts consisting of individual tutoring, conversation practice and testing periods.
3. Elementary Spanish (5) I., II., III. The Staff
   (Saramiego 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.
3ATA-3ATB-3ATC. Individualized Instruction in Spanish (1-2-2)-I-II-III. (Saramiego in charge)
Autotutorial: Prerequisite: course 2 or 1AATA-1ATB-1ATC. Continuation of course 2ATA-2ATB-2ATC.
4. Intermediate Spanish (5) I., II., III. The Staff
   Discussion—1 hour; recitation—4 hours. Prerequisite: course 3. Grammar review through oral and written exercises, and expansion of vocabulary through reading of modern texts.
5. Intermediate Spanish (3) I., II., III. The Staff
   Recitation—3 hours. Prerequisite: course 4. Continuation of course 4.
6. Introduction to Reading (3) I., II., III. The Staff
   Recitation—3 hours. Prerequisite: course 5. Reading of selected Spanish texts to acquaint students with a variety of written styles. Exercises and tests will emphasis comprehension and will focus on particular problems of grammar and vocabulary.
7A-7B. Grammar and Composition for Native Speakers (4-4) I-II. Chabran
Discussion—3 hours; compositions. Prerequisite: course 3 or the equivalent, or consent of instructor. Intensive grammar review and composition. Open to students whose native language is Spanish or to those who are bilingual. Not open to graduates of high schools where Spanish was the language of instruction. Open to majors and non-majors.
8A. Elementary Spanish Conversation (2) I., II., III.
The Staff
Discussion—2 hours. Prerequisite: course 4 or 8A; course 5 (concurrently) recommended. Continuation of course 8A. Limited enrollment. (P/NP grading only.)
8B. Elementary Spanish Conversation (2) I., II., III.
The Staff
Discussion—2 hours. Prerequisite: course 4 or 8A; course 5 (concurrently) recommended. Continuation of course 8A. Limited enrollment. (P/NP grading only.)
9. Intermediate Spanish Conversation (2) I., II., III.
The Staff
Discussion—2 hours. Prerequisite: course 5 or 8B; course 28 (concurrently) recommended. Directed group conversation with special emphasis on development of fluency in oral expression for the more advanced student. Limited enrollment. (P/NP grading only.)
28. Spanish Composition (4) I., II., III. The Staff
Discussion—3 hours; written assignments. Prerequisite: course 5. Development of writing skills through correct use of idiomatic expressions, practice in writing summaries and original compositions.
34. Mexico in Its Literature (3) II. Chabran
Chabran Lecture—3 hours. Introduction to significant literary trends in Mexican literature. Lectures and discussions in English, readings in either English or Spanish of representative works by major contemporary authors. May not be counted as part of the major or minor in Spanish.

35. Survey of Mexican Culture (3) III. Chabran
Lecture—3 hours. Indian cultural patterns before the discovery of Mexico; development of Mexican civilization during the Spanish conquest, the national and the Revolution of 1910; conductos in English. May not be counted as part of the major or minor in Spanish.
88. Directed Group Study (1-5) I., II., III. The Staff
(Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses
Course 100 is prerequisite to all upper division literature courses.
100. Introduction to Principles of Criticism (3) I., II., III. Alsent, in charge
Lecture—3 hours. Prerequisite: course 28. Designed to provide students with the skills to recognize the basic principles involved in literary criticism and a useful terminology to analyze the different genres of Hispanic literature.
103A. Hispanic Literature I: Medieval and Golden Age (4) I., II., III. Armistead, Díaz-Migoyo, Sánchez-Romero
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and of Spanish-American colonial literature.
103B. Hispanic Literature I: Medieval and Golden Age (4) I., II., III. Armistead, Díaz-Migoyo, Sánchez-Romero
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and of Spanish-American colonial literature.
104A. Hispanic Literature II: Modern Peninsular (4) I., Alsent, Gullón, Sánchez-Romero, Scari
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to 1900. Offered in odd-numbered years.
104B. Hispanic Literature II: Modern Peninsular (4) I., Alsent, Gullón, Sánchez-Romero, Scari
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to 1900. Offered in even-numbered years.
105A. Hispanic Literature III: Modern Spanish-American (4) I. Gertel, Jaén, Verani
Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Continuation of course 105A.
106A. Spanish-American Prose of the Twentieth Century (4) I. Gertel, Jaén, Verani
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the development of the novel. Offered in odd-numbered years.
106B. Spanish-American Prose of the Twentieth Century (4) II. Gertel, Jaén
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the development of the novel. Offered in even-numbered years.
108. Spanish Drama of the Golden Age (4) III. Sánchez-Romero
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Offered in even-numbered years.

NOTE: For key to footnote symbols, see page 133.
110. Advanced Spanish Composition I (4) I. Staff
   Discussion—3 hours; written reports. Prerequisite: course 28. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

110B. Advanced Spanish Composition II (4) II. The Staff
   Discussion—3 hours; written reports. Prerequisite: course 28. Practice in creative writing, with an aim toward refinement and appreciation of written expression and expansion of vocabulary.

111. Don Quijote (4) II. Diaz-Migyco
   Lecture—3 hours; written reports. Prerequisite: course 110.

112. Medieval Masterworks (4) I. Armistead
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of major works of Medieval Spanish literature from its origins up to the fifteenth century. Offered in odd-numbered years.

114. Spanish Romantic Literature (4) II. Gallón, Scarl
   Lecture—3 hours; conferences and reports. Prerequisite: course 100. Readings and lectures on romantic literature—first half of the nineteenth century, with emphasis on drama and poetry. Offered in even-numbered years.

115. Lyric Poetry of the Golden Age (4) II. Sánchez-Romero
   Lecture—3 hours; term paper. Prerequisite: course 100. Offered in odd-numbered years.

119. Spanish Novel of the Nineteenth Century (4) III. Gallón, Scarl
   Lecture—3 hours. Prerequisite: course 100. Offered in odd-numbered years.

120A. Twentieth-Century Spanish Fiction (4) I. Alisent, Diaz-Migyco, Gallón
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of the main literary trends and authors of the Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Blasco Ibáñez, Cela and others will be covered.

120B. Twentieth-Century Spanish Drama (4) III. Alisent
   Lecture—3 hours; term paper. Prerequisite: course 100. Offered in odd-numbered years.

120C. Twentieth-Century Spanish Poetry (4) III. Sánchez-Romero
   Lecture—3 hours; term paper. Prerequisite: course 100. Offered in even-numbered years.

124. Chicano Culture (4) I. Chabram
   Lecture—3 hours; term paper. Prerequisite: course 28 or consent of instructor. Study of Chicanos in culture in the 1960s and 1970s to the present. Emphasis on the period after 1968. Lectures and discussions in English; readings in English and/or Spanish. May not be counted as part of major in Spanish. Offered in even-numbered years.

125. Spanish-American Modernism (4) II. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of the poetry and prose of Spanish-American Modernismo (1880-1916). Offered in even-numbered years.

126A. Chicano Literature (4) I. Chabram
   Lecture—3 hours; term paper. Prerequisite: course 100, consent of instructor. Intensive study of select topics in Chicano literature including Chicano novel. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in even-numbered years.

126B. Chicano Literature (4) II. Chabram
   Lecture—3 hours; term paper. Prerequisite: course 100, consent of instructor. Intensive study of select topics in Chicano literature including Chicano theater. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in odd-numbered years.

126C. Chicano Literature (4) III. Chabram
   Lecture—3 hours; term paper. Prerequisite: course 100, consent of instructor. Intensive study of select topics in Chicano literature including Chicano poetry. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in odd-numbered years.

127. Contemporary Spanish-American Poetry (4) III. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 100. Development of Spanish-American poetry from the end of the sixteenth century to the present. Emphasis on works of Huldoñero, Neruda, Vallejo, Borges, and Octavio Paz. Offered in even-numbered years.

128. Contemporary Spanish-American Short Story (4) I. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 100. Literary trends in the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in even-numbered years.

129. The Mexican Novel (4) III. Chabram, Gertel, Jaén,Verani
   Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Major figures in the development of the Mexican novel. Offered in odd-numbered years.

131. Modern Spanish Syntax (4) I. Ojeda
   Lecture—3 hours; conferences and reports. Prerequisite: course 28 or consent of instructor. Principles of classical phonemics and morphemics together with more recent developments; descriptive analysis of modern Spanish sounds and articulatory and practical comparison with English and other Romance Languages.

133. Spanish Phonetics (3) I. De Torrecián
   Lecture—3 hours. Prerequisite: course 28 or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers.

134. Survey of Spanish Culture (4) I. Alisent, Diaz-Migyco
   Lecture—3 hours; paper. Prerequisite: course 28. Offered in even-numbered years.

135. Survey of Mexican Culture (4) II. Chabram
   Lecture—3 hours; paper. Prerequisite: course 28 or consent of instructor. Offered in odd-numbered years.

136. Survey of Spanish-American Culture (4) II, III. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 28. Major developments in the arts and social institutions of Spanish-speaking world outside of Mexico. Readings, lectures, and discussions in Spanish.

137. Contrastive Spanish-English Morphosyntax (4) II. Ojeda, Torrecián
   Lecture—3 hours. Prerequisite: individual and group conferences; term paper. Prerequisite: course 28 or the equivalent; Linguistics 1 or 150 recommended or consent of instructor. Contrastive grammatical analysis of English and Spanish, error analytica, introduction to methods and concepts of structuralist and transformational linguistics, the basic elements of morphology, constituent elements of the noun and verb phrases.

138. Contemporary Spanish-American Drama (4) I. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 100. Study of major authors, significant trends, as well as origins, development of the genre.

139. Latin-American Literature in Translation (4) III. Gertel, Jaén, Verani
   Lecture—3 hours; term paper. Prerequisite: course 100. Reading, lectures, and discussion in English of works by Neruda, Valéjo, Borges, García Márquez, Paz, and others. May not be counted toward major in Spanish. Offered in odd-numbered years. General Education credit: Civilization and CultureNon-Introductory. Recommended GE preparation: Comparative Literature 1, 2, or 3.

150. Masterpieces of Spanish Literature (4) I. Armistead, Gallón, Scarl
   Lecture—3 hours; paper. Readings, lectures, and discussion in English. May not be counted as part of the major in Spanish.

151. Study of a Major Writer (4) I, II, III. The Staff
   Lecture—3 hours; term paper. Prerequisite: course 100. May be repeated for credit with consent of instructor.

152. Internship in Spanish (1-12) I, II, III. The Staff
   (Chairperson in charge)
   Independent study—3-36 hours. Prerequisite: course 28; juniorstanding; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting, etc.). May be repeated for credit for a total of 8 units. Units will not count toward the Spanish major. (P/N grading only.)

158. Directed Group Study (1-5) I, II, III. The Staff
   (Chairperson in charge)
   Prerequisite: consent of instructor and Department Chairperson. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
   (Chairperson in charge)
   Prerequisite: consent of instructor and Department Chairperson. (P/N grading only.)

Graduate Courses

200. Techniques of Literary Scholarship (4) III. Armistead
   Seminar—3 hours; term paper. Elements of bibliography and fundamental methods of literary research. (SU grading only.)

209. Literary Theory and Criticism: Prose Fiction (4) III. Diaz-Migyco, Gertel, Gallón, Verani
   Seminar—3 hours; term paper. Study of contemporary literary theories and their application to twentieth-century Spanish American prose fiction.

210. Literary Criticism: Poetry (4) I. Gertel, Sánchez-Romero
   Seminar—3 hours; term paper. Offered in odd-numbered years.

220A. History of the Spanish Language (4) I. Torrecián
   Seminar—3 hours; term paper. Prerequisite: Latin 1.

220B. History of the Spanish Language (4) II. Torrecián
   Seminar—3 hours; term paper. Prerequisite: Latin 1.

221. Hispanic Dialectology (4) III. Torrecián
   Seminar—3 hours; term paper. Study of the varieties of dialect contact in the various peninsular and American Spanish dialects.

225A. Masterworks of Medieval Spanish Literature (4) I. Armistead
   Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of late Medieval Spanish prose works: didactic prose; sentimental and chivalric novel; La Celestina. Offered in even-numbered years.

225B. Masterworks of Medieval Spanish Literature (4) II. Armistead
   Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of late Medieval Spanish lyric poetry, the origins through the development of the genre in the fifteenth century. Offered in odd-numbered years.

225C. Medieval Spanish Epic (4) III. Armistead
   Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of major works of Medieval Castilian heroic poetry from its origins through the development of the genre in the fifteenth century. Offered in odd-numbered years.

225D. Medieval Lyric (4) III. Armistead
   Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of representative early lyric poetry in the various peninsular languages. Offered in odd-numbered years.

226. El libro de buen amor (4) II. Armistead
   Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the fourteenth-century didactic poem, El libro de buen amor (The Book of Good Love) by Juan Ruiz, Archpriest of Hita. Offered in odd-numbered years.
227. El Romancero (4) I. Armstead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of Hispanic ballad literature from the fifteenth century to the present. Offered in odd-numbered years.

228. Folk Literature of the Hispanic World (4) I. Armstead
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the various genres of oral traditional literature among the Hispanic peoples. Offered in even-numbered years.

229. Spanish Literature of the Early Renaissance (4) I. Armstead
Seminar—3 hours; term paper. Spanish literature, 1481–1588, with emphasis on La Celestina.

231A. Spanish Literature of the Golden Age: Lyric Poetry (4) I. Sánchez-Romeraño
Seminar—3 hours; term paper. Sixteenth-century currents in Spanish poetry. Offered in odd-numbered years.

231B. Spanish Literature of the Golden Age: Lyric Poetry (4) II. Sánchez-Romeraño
Seminar—3 hours; term paper. Seventeenth-century currents in Spanish poetry. Offered in even-numbered years.

231C. Spanish Literature of the Golden Age: Literature of Ideas (4) I. Díaz-Migoyo
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in odd-numbered years.

231D. Spanish Literature of the Golden Age: Narrative (4) II. Díaz-Migoyo
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

233E. Spanish Literature of the Golden Age: The Drama (4) II. Sánchez-Romeraño
Seminar—3 hours; term paper. Offered in odd-numbered years.

232. Cervantés (4) I. Díaz-Migoyo
Seminar—3 hours; term paper. Major works of Cervantes and of the principal Cervantine critics. Offered in odd-numbered years.

234A. Twentieth-Century Spanish Poetry (4) I. Sánchez-Romeraño
Seminar—3 hours; term paper. From 1986 up to the Generation of 1927.

234B. Twentieth-Century Spanish Poetry (4) II. Sánchez-Romeraño
Seminar—3 hours; term paper. New trends in Spanish poetry from 1997 to the present.

235A. Twentieth-Century Spanish Novel (1900–1956) (4) I. Atsaint, Guilón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the modern Spanish novel through discussion of works by Cela, Goytisolo, Martí, Santos, Sánchez-Ferriol, Benet, and others. Offered in odd-numbered years.

235B. Twentieth-Century Spanish Novel (4) II. Atsaint, Guilón
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main novelistic trends in the contemporary Spanish novel through discussion of works by Cela, Goytisolo, Martí, Santos, Sánchez-Ferriol, Benet, and others. Offered in even-numbered years.

236. Twentieth-Century Spanish Thinkers (4) III. Guilón, Scari
Seminar—3 hours; term paper. Major thinkers from Gasset to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in even-numbered years.

237. Twentieth-Century Spanish Drama (4) I. Atsaint
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the major trends and authors of the modern Spanish drama. Dramatists like Valle-Inclán, Lorca, Buero Vallejo, Arabal, Neria, and others will be covered. Offered in even-numbered years.

238. Spanish Romanticism (4) I. Guilón, Scari
Seminar—3 hours; term paper. Sources and development of Romanticism in Spain, particularly in poetry and drama.

239. Galáns and Spanish Realism (4) II. Guilón, Scari
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

240. Twentieth-Century Spanish-American Drama (4) II. Gertel
Seminar—4 hours; Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sanchez to the present. Offered in even-numbered 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 even-numbered 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 even-numbered years.

242. The Mexican Novel (4) III. Gertel, Jafin
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Emphasis on twentieth-century Mexican novel from Azuela, Yáñez, Rulfo, Fuentes to the present. Offered in odd-numbered years.

243. Spanish-American Short Story (4) III. Gertel, Jafin, W. H. Pinter
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 Modernismo (1880 to 1910). Offered in odd-numbered years.

247. New Directions in Spanish-American Poetry (4) III. Gertel, Verani
Seminar—3 hours; term paper. Offered in even-numbered years.

248. The Spanish-American Essay (4) II. Gertel, McLaren
Seminar—3 hours; term paper. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in odd-numbered years.

251. Studies on a Major Writer, Period, or Genre (4) II. The Staff
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major writer and his/her intellectual and literary milieu or study of a specific topic, period or genre. May be repeated with credit with consent of instructor.

259. Research (1–12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

Professional Courses

300. The Teaching of Spanish (3) III. Samariego
Lecture—3 hours. Prerequisite: senior or graduate standing; a minor or minor in Spanish.

300A. Problems in Teaching Spanish at College Level (3) I. Samariego
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

NOTE: For key to footnote symbols, see page 133.

309B. Problems in Teaching Spanish at College Level (1) I. Samariego
Discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required primarily for graduate teaching assistants. (SU grading only)

Speech

See Rhetoric and Communication

Statistics

(Intercollege Division)

George R. Grousas, Ph.D., Chairperson of the Division and Associate Dean of Statistics
Office, Division Office, 469 Kerr Hall (916-752-2361)

Faculty

P.K. Bhattacharya, Ph.D., Professor
Pravat Burman, Ph.D., Assistant Professor
Christina Drake, Ph.D., Assistant Professor
Alan P. French, Ph.D., Associate Professor
Wesley O. Johnson, Ph.D., Associate Professor
Yue-Pok (Ely) Mack, Ph.D., Associate Professor
Hans-Georg Mueller, Ph.D., Associate Professor
George R. Grousas, Ph.D., Professor
Francisco J. Samariego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Chih-Ling Tsai, Ph.D., Associate Professor
Jessica M. Utsi, Ph.D., Associate Professor
Jane-Ling Wang, Ph.D., Associate Professor
Alvin D. Wiggins, Ph.D., Professor

Statistics is a subject which touches our lives virtually every day in a variety of ways, from the amount we pay for insurance to the television shows which are left on the air. It has been developed to enable us to make inferences about entire populations, based on samples extracted from those populations. Thus, 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 Division of Statistics offers courses to fulfill needs at all levels. A minor in statistics gives the student a basic grounding in both theory and applications and would be a valuable complement to almost any major program. An undergraduate major in statistics is sufficient preparation for either a career or graduate study in the field.

Entry-level courses for students are as follows:
(a) Statistics 13, 32, and 102. These three courses are essentially equivalent in content, each designed as an introduction to the basic concepts and methods of probability and statistics. However, they differ from one another in the background expected of the student. Courses 13 and 102 require only high school algebra, although 102 is taught at a faster pace and covers somewhat more material. Course 32 is recommended as an alternative for students who have some background in computer programming and calculus; here students complement the analytical side of the lecture material by writing simulation programs which develop valuable intuitive insight.
(b) Statistics 130A–130B and 131A–131B–131C. These courses require calculus, and present both the methods of statistics and the probabilistic background on which these methods are based. The two sequences cover the same material, but the 131 course sequence goes into more depth. Neither sequence,
course 120 or 131, requires a prerequisite from the set, courses 13, 32, and 102, discussed above, but students often find such a background helpful.

(c) Statistics 120 is an alternative to Statistics 130A or 131A. It also requires calculus, but no prior knowledge of probability, and is primarily meant for Electrical Engineering students.

The Major Programs

Probability models and statistical methods are used in a number of fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created both in the public and private sectors a strong demand for graduates with statistical training. Currently 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.

The major programs in statistics are designed to make possible a wide variety of career choices. The Bachelor of Arts degree is very flexible, facilitating a double major or extensive elective course work in a field in which statistics is applied, The Bachelor of Science degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied course work and underscore the strong interdependence of statistical theory and the applications of statistics.

The concurrent study of statistics and a field of applications at the advanced level will serve students well either in preparing for a career in an area of application or in preparing for graduate study. Students with a strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics with that discipline.

Statistics and Computer Science. These two fields interact in many ways, with each discipline having applications to the other. Applied statistical work relies on computer science areas such as database management, numerical analysis, algorithm optimization and graphics, while computer science uses statistics in areas such as pattern recognition, evaluation of operating systems and simulation. Thus advanced courses in computer science are recommended for all students in statistics. In particular the degree program, Statistics—Computer Science, is designed as an integrated package combining statistics and computer science.

Students interested in one of the following major programs in Statistics are invited to meet with an undergraduate advisor for further information on planning a program.

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 or 21C
- Mathematics 22A, 22B
- Computer Science Engineering 30 or Engineering 5
- Statistics 32

In addition, due to space limitation in the B.S. major, students admitted to this major will 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.

A.B. Major Requirements:

Preparatory Subject Matter: 

<table>
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<th>Course</th>
<th>Units</th>
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<td>Calculus, Mathematics 21A, 21B, 21C</td>
<td>12</td>
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<td>Linear algebra, differential equations, Mathematics 22A, 22B</td>
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Computer Science, Computer Science Engineering 30 or Engineering 5 (or the equivalent): 

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<tr>
<td>Statistics 32</td>
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<td>Computer Science, Statistics</td>
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Depth Subject Matter: 

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<th>Course</th>
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<tbody>
<tr>
<td>Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent</td>
<td>6</td>
</tr>
<tr>
<td>Probability and mathematical statistics, Mathematics 131A, 131B, 131C</td>
<td>12</td>
</tr>
<tr>
<td>Three Statistics courses with Statistics 131B as a prerequisite</td>
<td>9-10</td>
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<tr>
<td>Related elective courses</td>
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<tr>
<td>Three upper division courses approved by major advisor</td>
<td>9</td>
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Total Units for the Major: 62-64

B.S. Major Requirements:

Options: Statistics—general; Statistics—Computer Science

Preparatory Subject Matter: 

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<tr>
<td>Calculus, Mathematics 21A, 21B, 21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra, differential equations, Mathematics 22A, 22B</td>
<td>6</td>
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Computer science:

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<th>Units</th>
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<td>General option</td>
<td>4</td>
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<tr>
<td>Computer Science Engineering 30 or Engineering 5 (or the equivalent)</td>
<td>3-4</td>
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<tr>
<td>Computer Science option</td>
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<tr>
<td>Computer Science Engineering 30 and 40 and Electric and Computer Science Engineering 70</td>
<td>3</td>
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<tr>
<td>Statistics through computers, Statistics 32-3</td>
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Statistics (general option)

Depth Subject Matter: 

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<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent</td>
<td>6</td>
</tr>
<tr>
<td>Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C</td>
<td>12</td>
</tr>
<tr>
<td>Four Statistics courses having Statistics 131B as a prerequisite</td>
<td>12-13</td>
</tr>
<tr>
<td>Linear algebra, Mathematics 167</td>
<td>3</td>
</tr>
<tr>
<td>Three upper division Mathematics courses selected from 106, 127A-127B-127C, 128A-128B-128C, 168 (Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics)</td>
<td>12</td>
</tr>
<tr>
<td>Related elective courses</td>
<td>9-10</td>
</tr>
<tr>
<td>Two upper division courses approved by major advisor. These may be in mathematics, computer science or in quantitative aspects of a substantive discipline</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Units for the Major: 75-85

(Generic option)

Computer Science option

Depth Subject Matter: 

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent</td>
<td>6</td>
</tr>
<tr>
<td>Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C</td>
<td>12</td>
</tr>
<tr>
<td>Two courses having Statistics 131B as a prerequisite</td>
<td>6-7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical computing, Statistics 141</td>
<td>3</td>
</tr>
<tr>
<td>Operating systems and system programming, Computer Science Engineering 150</td>
<td>3</td>
</tr>
<tr>
<td>Data structures, Computer Science Engineering 110</td>
<td>3</td>
</tr>
<tr>
<td>Data base systems, Computer Science Engineering 168</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 133.

Computer Science Engineering 122, or Computer Science Engineering 175-3

Total Units for the Major: 73-84

(Course option)

Major Advisor: W.O. Johnson.

Students are encouraged to meet with an advisor 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 advisor to plan the remainder of their undergraduate programs.

Minor Program Requirements:

The Division offers a minor program in Statistics that complements a survey of the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

Statistics 106, 108, and 130A-130B or 131A-131B | 16 |

One course in Statistics having Statistics 130B or 131B as a prerequisite | 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 Division of Statistics.

Graduate Advisor: F.J. Bainbridge.

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6096).

Courses in Statistics

Lower Division Courses

12. Introduction to Discrete Probability (3)}

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 even-numbered years.

13. Elementary Statistics (4) II, III. The Staff

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, chi-square distributions; testing hypotheses, nonparametric statistics; regression and correlation theory. (Students having had courses 103A or 101A may not receive credit for Statistics 13.) (CAN Stat 2).

32. Basic Statistical Analysis Through Computers (3) II, III. The Staff

Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming.

98. Directed Group Study (1-5). II, III. The Staff

Chairperson in charge

Prerequisite: consent of instructor. (PANP grading only)

Upper Division Courses

102. Introduction to Probability Modeling and Statistical Inference (4)

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: probab-
bility models—binomial, Poisson, geometric; normal and sampling distributions; graphics; exploratory data analysis; probability of incorrect parameter 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.

103. Applied Statistics for Business and Economics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102. Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; linear combinations of random variables; testing and estimation; Minitab computing package.


106. Applied Statistical Methods: Analysis of Variance (4) I, II, III. The Staff Lecture—4 hours. Prerequisite: course 13, 32, or 102. One-way and two-way layouts; fixed effects analysis of variance models. Randomized complete and incomplete block design, Latin squares. Multiple comparisons procedures. One-way random effects model.

110. Applied Statistical Methods: Regression Analysis (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages.

113. Applied Multivariate Statistical Analysis (3) I. The Staff Lecture—3 hours. Prerequisite: courses 13, 32, or 102. Simple linear regression, multiple regression, correlation, multiple correlation coefficients, one-way MANOVA. Linear discriminant functions. Principal component analysis. Factor analysis. Offered in odd-numbered years.

120. Probability and Random Variables for Engineers (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 168. Concepts of a probability space, conditional probability and independence, discrete and continuous random variables, moments and moment generating functions, transformation of random variables, expected value and variance, use of moment generating functions, random variables used in probability models, joint distribution of random variables, correlation, marginal and conditional distributions.

130A. Mathematical Statistics: Brief Course (4). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B and course 130A. Sampling distributions, sums of random variables, the t, F, and χ2 distributions, central limit theorem and application, parametric point and interval estimation, one-sample and two-sample hypothesis testing, introduction to regression analysis, and analysis of variance.

131A. Introduction to Probability Theory (4). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment generating functions, laws of large numbers and the central limit theorem. Students who have had Mathematics 131 may not receive credit for Statistics 131A.

131B-131C. Introduction to Mathematical Statistics (4-4)-III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A, or Mathematics 22A and 131. Sampling, methods of estimation, hypothesis testing, confidence intervals, test hypotheses, linear regression, analysis of variance, elements of large sample theory, and nonparametric inference.

132. Engineering Statistics (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; one course from courses 130A, 131A, Engineering 118, or Mathematics 131. Not open to Statistics majors. Statistical estimation, hypothesis testing, correlation, simple linear regression, least squares estimation, confidence intervals, prediction intervals, multiple regression, goodness-of-fit, analysis of variance, factorial design, contingency tables, chi-square tests, applications to engineering problems.

133. Applied Stochastic Modeling and Statistical Theory (6). Sem. Saniego Lecture—5 hours; discussion—1 hour. Prerequisite: course 132 or 131B. Concepts of a probability space, conditional probability and independence, discrete and continuous random variables, laws of large numbers, the central limit theorem, and approximations.

134. Nonparametric Inference (3) I. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference. Some one-sample and k-sample point of view topics include Kolmogorov-Smirnov type tests, confidence intervals for quantiles, location and scale parameters, rank tests, dispersion tests, efficiency. Offered in odd-numbered years.

135. Multivariate Data Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Quantitative description and analysis of social and biological problems. Multivariate statistical procedures implemented through computer methods. Applied time series, factor and cluster analysis.

136. Applied Linear Models (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A; or either course 130B or 132; or course 131B. Simple and multiple linear regression analysis and analysis of variance within the framework of linear models: general linear model; simple and multiple linear regression, polynomial regression; one-factor and multi-factor designs; multiple and mixed models, multiple comparisons; analysis of covariance.

137. Applied Time Series Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Auto- and cross-correlation, spectral analysis, coherence, transfer relations, linear filters, seasonal adjustment, trend and season regression, autoregressive moving average models, forecasting, Box-Jenkins methods, spectral analysis of variance, and signal detection and discrimination methods.


141. Statistical Computing (3). The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A or 131A or the equivalent; one course from Computer Science Engineering 30 or 5 Engineering 5; knowledge of regression analysis and matrix algebra. Computational aspects of linear models and nonlinear models: development of package-based programs; simulation techniques; graphics.

NOTE: For key to footnote symbols, see page 133.

142. Reliability (3) II. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Methods and inferences for reliability systems. Topics include coherent systems, statistical failure models, notions of aging, maintenance policies and their optimization. Offered in odd-numbered years.

143. Survival Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, or 131C (may be taken concurrently). Statistical methods for time to failure data, assessing risk of failure, parametric and nonparametric estimates of probabilities for time to failure, packaged computer programs, applications to medical and life data. Selected topics from model selection, accelerated failure time models, Cox models, nonparametric methods. Offered in even-numbered years.

144. Sampling Theory of Surveys (3). II. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in even-numbered years.

145. Bayesian Statistical Inference (3) III. The Staff Lecture—3 hours. Prerequisite: courses 130A-130B or 131A-131B-131C or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision making, and hypothesis testing, prediction, empirical Bayes methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, hierarchical models, decision analysis, applications. Offered in odd-numbered years.

192. Internship in Statistics (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3 to 36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (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: III. I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Statistical Methods for Research (3) III. The Staff Lecture—3 hours. Prerequisite: course 106 or the equivalent. Topics in experimental design include: Latin squares, Youden squares, randomized block designs, completely randomized designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, experimental designs based on various criteria, analysis of covariance.

221. Biostatistics: Risk Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: courses 131A and 131B; consent of instructor. Modern methodologies for scientific inference in bioassay and medical trials; low-dose extrapolation problems; retrospective studies; standardization of rates; clinical trials; cohort life tables.

222. Biostatistics: Applied Stochastic Processes and Survival Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: courses 131A and 131B, and consent of instructor; Mathematics 132A recommended. Brief review of Markov models and generating functions; epidemic models; spatial processes; Chapman-Kolmogorov equations; general illness-death (Fay-Neuman) model, failure-time models; survival analysis; covariate adjustment in survival studies; survival analysis with incomplete data.

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, δ-method, consistency and
asymptotic normality of maximum likelihood estimates, method of scoring, hypotheses 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 hypotheses testing, multivariate techniques. Large sample theory.

232A-232B. Linear Model Theory (4-4-4) I-II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

232C. Advanced Regression Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 108 and 130B or 131C, or consent of instructor. Techniques of variable selection; problems of multicollinearity; nonlinear regression. Special topics.

233. Design of Experiments (3) III. The Staff
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surface models. Offered in odd-numbered years.

235A-235B-235C. Probability Theory (3-3-3) I-II-III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 128A or 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 theorems, conditional expectations, topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

236A. Advanced Mathematical Statistics: Sequential Analysis (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231C. Sequential decision functions, Bayes and minimax rules, backward induction, sufficiency and invariance under sequential sampling. Wald SPRT and its optimality, continuous time SPRT, repeated significance tests, confidence intervals. Offered in odd-numbered years.

236B. Advanced Mathematical Statistics: Nonparametric Theory (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 134 and 231C. Locally most powerful and powerful rank tests, asymptotic distribution theory under null hypothesis and under local alternatives, empirical process, Kolmogorov-Smirnov and Cramér-von Mises tests, representation of sample quantities, nonparametric density estimation and nonparametric regression. Offered in even-numbered years.

237A. Time Series Analysis: Foundations (3) I. The Staff
Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in odd-numbered years.

237B. Time Series Analysis: Statistical Inference (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 131B-131C and 237A. Multivariate normal processes, spectral expansion, tests of hypotheses; regression, discrimination; filtering, spectral analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in even-numbered years.

238A. Theory of Multivariate Analysis I (3) III. The Staff
Lecture—3 hours. Prerequisite: course 231C or consent of instructor. Review of matrix algebra; standard multivariate normal distribution theory; multiple, partial, and canonical correlation; maximum likelihood estimation; properties of the Wishart distribution; Hotelling's T² test; union intersection principle; simultaneous linear components; likelihood ratio testing procedure; multivariate regression analysis. Offered in odd-numbered years.

238B. Theory of Multivariate Analysis II (3) III. The Staff
Lecture—3 hours. Prerequisite: course 239A. Multivariate analysis of variance; profile analysis; growth curve analysis and component analysis; inference on covariances; factor analysis. Classification and discrimination; distribution of characteristic roots. A Bayesian approach to multivariate analysis. Testing independence of sets of variates, canonical correlations, cluster analysis. Offered in odd-numbered years.

250. Advanced Data Analysis (4). I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 231A-232A and either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, incomplete data analysis, diagnostics, nonstandard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in even-numbered years.

260. Seminar in Statistics (1-6) I, II, III. The Staff (Chairpersons: S. E. Kullback, J. H. Hodges, R. E. Barlow, Jr.)
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

266. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (S/U grading only.)

300. Dissertation Research (1-12) I, II, III. The Staff
Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only.)

Professional Course
401. Methods in Statistical Consulting (3) I, II, III. The Staff
Supervised consultation—3 hours. Prerequisite: graduate standing in Statistics. Students observe faculty consulting with clients and discuss with faculty methods of analyzing their data or of designing their experiments. Students may also perform data analysis. Following this, students do supervised, then unsupervised, but reviewed, statistical consulting. May be repeated once for credit. (S/U grading only.)

Statistics (A Graduate Group)
George G. Roussas, Ph.D., Chairperson of the Group
Group Office, 469 Kerr Hall (816-752-2361)
Faculty. The Group has approximately thirty faculty members from the colleges, schools, and divisions, including fourteen from the Intercollegiate Division of Statistics.

Graduate Study. The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information, see the Graduate Announcement, or contact the Chairperson of the Group.

Graduate Adviser. F.J. Samaniego.

Statistics (A Graduate Group)

Subject A
See under University Requirements; and English A.

Surgery
See Surgery (Medicine, School of); and Surgery (Veterinary Medicine), below

Surgery
(School of Veterinary Medicine)
Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department
Department Office, 2112 Medical Science 1A (916-752-3599)
Faculty
Claes S. Bailey, D.V.M., Ph.D., Associate Professor
Roy W. Beilhorn, D.V.M., M.S., Professor
Eugene M. Breznock, D.V.M., Ph.D., Professor
Nedim C. Buyukmihhi, V.M.D., Associate Professor
Robert M. Cello, D.V.M., Professor Emeritus
Ira M. Gourley, D.V.M., Ph.D., Professor
Clare R. Gregory, D.V.M., Assistant Professor
Steve C. Haskins, D.V.M., M.S., Professor
Susan V. Hildebrand, D.V.M., Associate Professor
Terrell A. Holliday, D.V.M., Ph.D., Professor
Janet E. Ikow, B.V.Sc., Ph.D., Assistant Professor
David N. Krag, M.D., Ph.D., Assistant Professor in Residence
Robert L. Leighton, V.M.D., Professor Emeritus
Robert L. Linford, D.V.M., Ph.D., Assistant Professor
Bruce R. Madewell, V.M.D., M.S., Professor
Dennis M. Mragher, D.V.M., Ph.D., Professor
Harold R. Parker, D.V.M., Ph.D., Professor Emeritus
John R. Pascoe, B.V.Sc., Ph.D., Associate Professor
Peter J. Pascoe, B.V.Sc., Assistant Professor
Eugene P. Steffey, V.M.D., Ph.D., Professor
Gregory H. Theilen, D.V.M., Professor
Philip B. Vasseur, D.V.M., Assistant Professor
John D. Weld, D.V.M., Professor
Aldia P. Wind, M.V.D., Senior Lecturer

Part-Time Clinical Faculty
Gregory L. Ferraro, D.V.M., Associate Clinical Professor
Randal H. Spaglotti, D.V.M., Assistant Clinical Professor
Leigh West-Hyde, D.V.M., Assistant Clinical Professor
Pauline L. Wong, D.V.M., Lecturer

Courses in Surgery
Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Steffey in charge) (P/NP grading only)

Graduate Courses
230. Principles of Anesthesia and Surgery for Investigators (2) II. Steffey, Gourley
Lecture—2 hours. Prerequisite: graduate or professional student or consent of instructor. Presentation and integration of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student numbers.

230L. Principles of Anesthesia and Surgery for Investigators (2) II. Gourley, Steffey
Discussion—1 hour. Laboratory—4 hours. Prerequisite:
course 230 concurrently. Laboratory to complement course 230. Honors enrollment (SU grading only.)

291. Anesthesia/Critical Care Basic Science Conference (1), I, II, III. The Staff (P. Pascoe in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical, or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (SU grading only.)

293. Anesthesia/Critical Care Case Management Conference (1), I, II, III. The Staff (Wong in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical, or graduate student; consent of instructor. Discussion of Veterinary Medical Teaching Hospital case material to illustrate specific medical problems and their preventive and corrective management. (SU grading only.)

298. Group Study (1-6) I, II, III. The Staff (Steffey in charge)

299. Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Courses

411. Small Animal Surgery (1/2 per week) I, II, III. The Staff (Vasseur in charge) Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of pet animal patients in the hospital, including diagnostic examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)

412. Large Animal Surgery (1/2 per week) I, II, III. The Staff (Meagher in charge) Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of farm animal surgical patients in the hospital and outpatient clinic including physical examinations, presurgical work-up, assistance at operations, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)

414. Veterinary Anesthesiology (1/2 per week) I, II, III. The Staff (Steffey in charge) Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for anesthesia of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (SU grading only.)

420. Veterinary Neurology (1/2 per week) I, II, III. Holiday Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of hospital and outpatient including history taking, neurologic examinations and special diagnostic and therapeutic procedures under the direction of the staff neurologist. (SU grading only.)

422. Veterinary Ophthalmology (3/4-1 1/2 per week) I, II, III. Buyukkaya Laboratory—25-50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for the care of animals in the hospital and out-patient clinic including history taking, ophthalmologic examinations, special diagnostic techniques, assistance at ophthalmic surgery and medical and post surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (SU grading only.)

492. Large Animal Grand Rounds (1/2) I, II, III. The Staff (Meagher in charge) Discussion—1 hour. Prerequisite: professional standing; House Officer in Veterinary Medical Teaching Hospital or consent of instructor. House Officers take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. (SU grading only.)

Textile Science

See Fiber and Polymer Science

Textiles (A Graduate Group)

S. Haig Zeronian, Ph.D., D.Sc., Chairperson of the Group

Group Office, 129 Everson Hall (916-752-6650)

Faculty

The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Adviser. S. Haig Zeronian (Textiles and Clothing).

The Major Program

Textiles and Clothing is concerned with the study of textile products. Integrative product and process knowledge are stressed in relation to the production, distribution, and consumer use of textiles and apparel. Within the Textiles and Clothing major there are two options that share preparatory subject matter course work in textiles and clothing, as well as in the social sciences-humanities and the physical sciences.

The Multidisciplinary option provides students with a broad interdisciplinary base in both the physical and the social sciences, as relevant to the study of textiles and clothing. This base includes (a) physical and chemical properties of textiles, (b) production, end-use applications, and care of textiles, (c) apparel structures and production, and (d) social-psychological and economic aspects of textiles and clothing.

Students pursuing this option are expected to have a particular area of emphasis in textiles through careful selection of restricted electives in consultation with an adviser. The option prepares students for (e) advanced studies in textiles and clothing, or related fields in the physical or social sciences, or (b) careers in textiles and clothing such as production, testing, quality control, technical service, marketing, textile journalism, and design. Those students interested in careers in extension service and teaching should consult with their adviser.

The Marketing option involves an emphasis in social science and business course work, while also providing students with an awareness of the physical nature of textile products. This option provides students for (a) careers in marketing, management, and merchandising, as well as for (b) advanced studies in textiles and clothing with emphasis in the social-psychological or economic aspects of marketing or administration, or in consumer behavior.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable.) Courses shown without parentheses are required.

UNITS

Written/Oral Expression ........................................ 9

Preparatory Subject Matter ...................................... 39-41

Computer science (Agricultural Science and Management 21, Computer Science Engineering 10, or Sociology 40) ........................................ 2.3

Economic principles (Economics 1A-1B) ...................... 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 6, 8) .......... 8

Option-Specific Preparatory Subject Matter

16-18

Marketing Option ........................................ 16

Accounting (Economics 11A-11B) ............................. 8

Chemistry (Chemistry 10) ..................................... 4

Mathematics (Mathematics 16A-16B) ......................... 6

OR

Multidisciplinary Option ....................................... 16

Chemistry (Chemistry 1A, 1B, 8A, 8B) ........................ 16

Breadth/General Education ..................................... 6-24

Satisfaction of General Education requirement ............. 16

Marketing Option Depth Subject Matter ................. 54

Agricultural economics (Agricultural Economics 100A-100B, 106, 136) ........................................ 16

Social research methods (Sociology 46A or Psychology 41) ........................................ 4

Statistics (Statistics 103) ..................................... 4

Psychology (Psychology 145 or 183) ......................... 4

Textiles and clothing (Textiles and Clothing 107, 110, 162, 162L, 163, 163L, 164, 172, 174, 177) .......... 27

Multidisciplinary Option Depth Subject Matter ............. 43

Agricultural Economics (Agricultural Economics 112, 113) ........................................ 8

Design (Design 143) ........................................ 8

Psychology (Psychology 145 or 183) ......................... 4

Textiles and clothing (Textiles and Clothing 107, 107, 161L, 162, 162L, 163, 163L, 172, 174, 177) .......... 27

Marketing Option Restricted Electives ..................... 15

Courses selected from the following:

Agricultural Economics 18, 112, 141M, 142, 156, 157, 171A, 171B, Anthropology 122, 126, Consumer Science 100, Design 143, Economics 101, 121A, 121B, 134, 162, and other relevant

NOTE: For key to footnote symbols, see page 133.
course work, Foreign language, a maximum of 15 units, Mathematics 16C, Psychology 145, 183, Sociology 123, 126, 140, 141, 145, Textiles and Clothing 170, 180A, 180B, 220, 230, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

**Multidisciplinary Option Restricted Electives**


**Marketing Option Unrestricted Electives 15-41**

**Multidisciplinary Option Unrestricted Electives**


**Total Units for the Degree**

- 180

**Major Adviser.** S.H. Zenorion

**Advising Center** for the major is located in 129 Eton Hall (916-752-4477)

**The Minor Program:**

The Division of Textiles and Clothing offers a minor program for non-major interested in satisfying secondary career objectives. For acceptance into the program see the staff adviser in 129 Eton Hall.

**Textiles and Clothing**

- 18

**Minor Adviser.** S.H. Zenorion

**Graduate Study.** A program of study is offered leading to the degree of Master of Science in Textiles. Information can be obtained from the graduate adviser, S.H. Zenorion. Also see the Graduate Division section in this catalog.

**Related Courses.** See courses in Consumer Science and Design.

**Courses in Textiles and Clothing**

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing.

**Under Division Courses**

6. Introduction to Textiles (4) III. The Staff Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. (CAN-SIGN 60)

8. The Textile and Apparel Industries (4) I. Rucker Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

92. Internship in Textiles and Clothing (1-12) I, II, III. The Staff (Rucker in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience in college 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**

100. Principles of Polymer Materials Science (3) III. Zenorion Lecture—3 hours. Prerequisite: Chemistry 1A or 1B, or Chemistry 9A or 9B and Engineering 45, Introductory physics. The basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer properties, properties of related reactions; polymer morphology, rheology, and characterization: polymer processing. (Same course as Engineering 147)


110. Synthetic Fibers and Plastics in Society (3) III. Needles Lecture—3 hours. Prerequisite: Chemistry 10 or 10A in the physical sciences. Basic concepts and methodologies in study of synthetic fibers and plastics. Fiber and plastic formation, classification, structure, properties, processing, formulation, and applications. Impact of fibers and plastics on society and the environment. General Education credit: Natural and Environment/Non-Introductory. Recommended GE preparation: Chemistry 10 or introductory course in physical sciences.

130. Polymer Syntheses and Reactions (3) III. Hoechst Lecture—3 hours. Prerequisite: Chemistry 128B or 88, 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) III. Zenorion Lecture—3 hours. Prerequisite: course 6 and Chemistry 9B. The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interrelations of fibers and detergents.

161L. Textile Chemical Analysis Laboratory (1) III. Zenorion Laboratory—3 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries.

162. Textile Fabrics (3) III. The Staff Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to workability, comfort, and appearance.

162L. Textile Fabrics Laboratory (1) III. The Staff Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to workability, comfort, and appearance.

163. Textile Coloration and Finishing (3) I. Needles Lecture—3 hours. Prerequisite: course 6, 110, or Chemistry 9B. 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. 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 resulting textile.

164. Principles of Apparel Production (3) III. Heise Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering.

170. Advanced Clothing Structure (5) I. The Staff Lecture—3 hours; laboratory—6 hours. Prerequisite: course 6 and either clothing construction or introduction to clothing construction skills required. Introduction of drafting, flat pattern and draping principles for deriving two-dimensional patterns for three-dimensional clothing structures. In-depth studies of the interrelationships and the combined applications of clothing structure principles. Analytical and experimental approaches are emphasized for structural development.

173. Principles of Fashion Marketing (3) II. Rucker Lecture—3 hours. Prerequisite: course 8, Economics 1A, Agricultural Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization and management, pricing, promotion, and personnel.

174. Introduction to World Trade in Textiles and Clothing (2) II. Rucker Lecture—2 hours. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution pattern with a review of political, economic, and technological factors that are changing these industries and their markets.

177. Clothing and Social Perception (3) III. Kaiser Lecture—3 hours. Prerequisite: course 107; Sociology 2; Psychology 1: Social and cognitive processes related to the meanings people assign to clothing cues when perceiving one another. Particular attention to the following social-related phenomena: social status, sex, physical attractiveness, status, ethnicity: influences of clothing and appearance on social interactions.

180A-180B. Introduction to Research in Textiles (2-2)-I, II, III. The Staff (Rucker in charge) Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)

182. Internship in Textiles and Clothing (1-12) I, II, III. The Staff (Rucker in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience on campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only)

197T. Tutoring in Textiles and Clothing (1-5) I, II, III. The Staff (Rucker in charge) Discussion-laboratory—3-15 hours. Prerequisite: upper division textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit. (Tutoring another textiles course. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge) (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-12) I, II, III. The Staff (Rucker in charge) (P/NP grading only)

**Graduate Courses**

220. Textile Product Quality and Standards (3) III. Zenorion Lecture—3 hours. Prerequisite: course 161. Principles involved in establishing standards for implementation of government laws and regulations concerning textiles and clothing and quality controls for textile products. Offered in even-numbered years.
Urology

See Medicine, School of

Vegetable Crops

(College of Agricultural and Environmental Sciences)
Shirley Fa-Hng, Ph.D., Acting Chairperson of the Department
Department Office, 152 Hunt Hall (916) 752-0516

Faculty
Alan B. Bennett, Ph.D., Associate Professor
Arnold J. Bloom, Ph.D., Associate Professor
Kent J. Bradford, Ph.D., Associate Professor
Martha Cantwell, Ph.D., Lecturer
James F. Harrington, Ph.D., Professor Emeritus
Frederick D. Howard, Ph.D., Senior Lecturer Emeritus
Louise E. Jackson, Ph.D., Assistant Professor
Richard A. Jones, Ph.D., Professor
Oscar A. Lorenz, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor
Richard W. Michelmore, Ph.D., Associate Professor
Leroy L. Mowry, Ph.D., Professor Emeritus
Donald J. Nevins, Ph.D., Professor
Harlan K. Pratt, Ph.D., Professor Emeritus
Carlos F. Quiros, Ph.D., Associate Professor
Leroy L. Mowry, Ph.D., Professor Emeritus
Charles M. Rick, Ph.D., Professor Emeritus
Vincent Rubatzky, Ph.D., Lecturer
Dina St. Clair, Ph.D., Assistant Professor

Mikai E. Saltveit, Jr., Ph.D., Associate Professor
Carol Sherman, Ph.D., Assistant Professor
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor Emeritus
Herman Timm, Ph.D., Lecturer
Ronald E. Voss, Ph.D., Lecturer
James E. Weich, Ph.D., Lecturer Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus
Shang Fa Yang, Ph.D., Professor
John I. Yoder, Ph.D., Assistant Professor

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 Division section in this catalog.

Graduate Adviser: A. B. Bennett

Related Courses
See Plant Science 2, 101, 102, 112L, 112L, 221A, 221B.

Courses in Vegetable Crops

Questions pertaining to the following courses should be directed to the instructor or to the Advising Office, 137 Hunt Hall.

Lower Division Course
92. Internship in Vegetable Crops (1-3) I, II, III.

The Staff (Department Chairperson in charge)
Laboratory—3-36 hours. Work-learn 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. (PINP grading only.)

Upper Division Courses
101. Principles of Vegetable Crop Production (4) II.

Jones

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C and Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution.

105. Vegetable Biology, Evolution, and Systematics (4) I.

Yoder

Lecture—2 hours; laboratory—4 hours; field trips and written and oral reports. Prerequisite: Biological Sciences 1C; Botany 108 recommended. Taxonomic and morphological classification of the more important vegetable crops, their origin, morphology, nomenclature, and description; wild vegetable species, minor and exotic vegetables, and trends in development of new cultivars.

118. Seed Production, Technology, and Physiology (4) II.

Bradford

Lecture—4 hours; laboratory—4 hours. Prerequisite: Botany 112 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 seed. Laboratory sessions include field trips to seed industry facilities.

150. Vegetables in World Food Production Systems (4) I.

Sherman

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Biological Sciences 1C; course 101 recommended. World food production, evaluation of cropping systems and priorities for agricultural research. Existing and potential systems in tropical, subtropical, arid and temperate regions, emphasizing usage, cultural practices, handling, nutritional importance and current research goals for significant vegetable crops.

190. Topics in Plant Science Research (1-1)

The Staff

Discussion—1 hour. Prerequisite: undergraduate standing in the field of biological sciences. Discussion and critique of current research by faculty, graduate students, and undergraduate students. May be repeated for a maximum of 3 units. (PINP grading only.)

191. Undergraduate Research: Proposal (1-3)

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 design a problem, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a working outline, and write and revise a draft proposal. (PINP grading only.)

191L. Undergraduate Research: Experiment (1-5)

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. (PINP grading only.)

192. Internship in Vegetable Crops (1-12) I, II, III.

The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn 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. (PINP grading only.)

194H. 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. (PINP grading only.)

195. Field Study of Vegetable Industry (1) I.

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. (PINP grading only.)

197T. Tutoring in Vegetable Crops (1-3) I, II, III.

The Staff (Chairperson in charge)
Laboratory—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (PINP grading only.)

198. Directed Group Study (1-5)

I, II, III.

The Staff (Chairperson in charge)
(PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5)

I, II, III.

The Staff (Chairperson in charge)
(PINP grading only.)

Graduate Courses
212. Postharvest Physiology of Vegetables (4)

Saltveit and Yang

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 112 or Plant Science 112. Comparative physiological of harvested vegetables; emphasis on matura- tion, senescence, compostion changes, stress and storage problems; effects of growth regulators and effects of environmental factors. Laboratories stress concepts and research procedures. Offered in even-numbered years.

220. Biotechnology and Genetics of Crop Improvement (3)

Michelmore

Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113; Genetic 102A, 102B recommended. Emphasizes the integration of modern biotechnology and classical plant breeding in crop improvement. Subjects include modern molecular methods, 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)

Michelmore

Laboratory—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 Brassica species, mapping disease resistant genes.

221. Genetics and Cytogenetics of Vegetable Crops (3)

Ploence

Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytotgenetics of the
Veterinary Medicine, School of

Edward A. Rhode, D.V.M. Dean of the School
George H. Cardwell III, D.V.M., Ph.D. Associate Dean—Instruction
Bennie I. Ozburn, D.V.M., Ph.D. Associate Dean—Research
Donald G. Low, D.V.M., Ph.D. Associate Dean—Public Programs
Robert J. Hansen, Ph.D., Associate Dean—Student Services
William J. Winchester, D.V.M., Assistant Dean
School Office, 1018 Haring Hall (916-752-1390)

Courses in Veterinary Medicine

Upper Division Course

192. Work-Learn Experience in Veterinary Science (1-12) II, IV IV Cardine
Discipline and clinics—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine (SU grading only)

190. Professional Courses

400. Informatics (1.0) I Cardine
Discussion—2 hours; laboratory—8 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Understanding of elementary computer skills and proficiency with the use of microcomputers within the science laboratories of instruction. (SU grading only)

401. Microscopic and Gross Veterinary Anatomy (4.0) I-H. Hyde
Laboratory—54 hours; laboratory—50 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Normal interrelationships of structure and function through an integrated presentation will be achieved through the "real time" use of microcomputers within the science laboratories of instruction. (SU grading only)

402A. Systemic Physiology: Gastrointestinal and Cardiovascular Systems (2.9) I-IV Bruss
Lecture—22 hours; laboratory—32 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Basic principles of normal physiologic function in the vertebrate gastrointestinal and cardiovascular systems. These principles are essential for understanding of disorders of the gastrointestinal and cardiovascular systems.

402B. Systemic Physiology: Urinary System and Body Fluids (1.7) I-IV Bruss
Lecture—19 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the various functions of the kidney and the urinary system; body fluids and acid-base physiology and mammalian physiology.

402C. Systemic Physiology: Respiratory System (1.8) I-IV Jones
Lecture—12 hours; laboratory—6 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Provides a basic understanding of normal physiologic function of the vertebrate respiratory system.

403. Physiological Chemistry (8.5) I Black
Lecture—57 hours; laboratory—9 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Emphasizes biochemical concepts used to analyze problems and evaluate metabolic relationships important in animal health and disease.

403B. Pharmacology (2.3) I-IV Giraffe
Lecture—21 hours; laboratory—demonstration—2
three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Mechanisms and effects of various organ systems from a comparative, animal-oriented viewpoint. Laboratories are designed to demonstrate the application of such material to the functional medicine. Review of body systems. Introduction to receptors, receptor action, and the design and use of drugs. Pharmacology and the mechanism of action of drugs in selected species. Principles of a drug's effectiveness and failure in therapy. (SU grading only)

404. Fundamentals of Radiography (2.7) I-IV Morgan
Lecture—23 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Ionizing radiation and its interaction with matter and biological systems; instrumentation and principles of diagnostic radiology, radiocurative and nuclear medicine; diagnostic applications of x-rays and basic principles of veterinary radiology.

405. Veterinary Parasitology (3.6) I-IV Conard
Boycie
Lecture—26 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the important biological and clinical aspects of parasites and the disease they cause in animals.

405B. Clinical Parasitology (3) I-IV Boycie
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Ecology, pathology, diagnosis, and therapeutics of the more important parasites of domestic animals.

407. Principles of Surgery (1-9) I-IV Boycie
Lecture—7 hours; pre-clinical first year standing in the School of Veterinary Medicine. Overview of animal behavior with relevance to veterinary medicine.

407A. Principles of Surgery (1) I-IV Vassar
Lecture—9 hours; laboratory—1 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Concept of total patient care will be developed and applied to patient undergoing surgical management. Emphasis on principles of surgical physiology emphasized.

407B. Principles and Techniques of Surgery (2) I-IV Gouley
Lecture—9 hours; laboratory—9 three-hour sessions; discussion—3 three-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-IV Stover
Laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Study of anatomical topics as applied to selected surgical procedures. Topographical features useful to approaching organs and structures described. Tissues and structures basic to surgery emphasized.

408. Nutrition and Nutritional Diseases in Animals (2.9) I-IV Morris
Lecture—27 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Principles of nutrition and their application to the solution of nutritional disorders of animals.

409. Epidemiology (1.7) I-IV Gardner
Lecture—11 hours; discussion—6 hours. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to epidemiology and its applications in veterinary medicine.

410. Veterinary Toxicology (2.8) I-IV Mount
Lecture—28 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Diseases of animals produced by chemical poisons, organic and inorganic, the prevalence of toxic agents in the environment and exposure of animals to them; the incidence, pathology, pathogenesis, diagnosis, and treatment of diseases produced by poisons will be discussed.

411A. Laboratory Animal Medicine (2) I-IV 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. Laboratory demonstrations with subject species will be provided.

412. Laboratory Animal Medicine (2) III. Books Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species. Emphasis will be placed on animal colony health management techniques and control of contagious and life-threatening disease. Examples will be used to bring out the importance of disease as a constant threat to research work.

413. Medical Primatology (2) III. Roberts Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive nonhuman primates. (SU grading only.

415. Management and Disease of Captive Wildfife (2) III. Fowler Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures, demonstrations, and discussions will include selected medical problems of captive wild animals.

416. Aquatic Animal Medicine (2) III. Hedrick Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Ecology, pathology, diagnosis, treatment and prevention of disease of fish and some aquatic arthropods and amphibians. Preventive management and husbandry in aquaculture.

417. Cage Bird Medicine (2) II. Ramsay Lecture—20 hours. Prerequisite: third-year veterinary medical student or consent of instructor. Medical and surgical problems of caged birds: handling and restraint, feeding, nutritional and infectious diseases, anesthesia and surgery, plus problems of organ systems.

418. Diseases of Free Living Wildlife (2) II. Fowler Lecture—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 medical management of free-living populations.

419. (2) I. Zee, Yima Lecture—19 hours. Laboratory—8 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Introduction to the classification and biology of major types of infection in animals, with emphasis on the effects of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of animals.

420. Immunology (3.0) III. Garshin Lecture—20 hours. Laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Concepts of immunology. Emphasis is on the principles of vaccination, responses to pathogenic agents, and the development of hypersensitivity and autoimmune reactions.

420B. Musculoskeletal System-Abnormal Functions (4.5) III. Wein Lecture—38 hours. Laboratory—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Abnormal function of the musculoskeletal system and diseases affecting the musculoskeletal system. The manifestation, pathology, pathogenesis, diagnosis and medical and surgical treatments of musculoskeletal disease will be discussed.

421. Auditory and Neurosensory (2.7) II. Hyde Lecture—22 hours. Laboratory—5 three-hour sessions. Prerequisite: first year standing in School of Veterinary Medicine. An integrated study of normal neurobiology, neuroanatomy, and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.

421B. Neurology-Abnormal (3.5) III. Holiday, Bailey Lecture—48 hours; laboratories—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Abnormal function of the nervous system and diseases affecting the nervous system in animals. Manifestations of diseases, pathophysiology, pathogenesis, diagnosis and medical and surgical treatments of neurologic diseases will be discussed.

422. Veterinary Ophthalmology (2.5) II. Belfond Lecture—21 hours; laboratory—4 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Normal structure and function of the eye and the response of the eye to disease. All species of domestic animals will be included. Discussion of selected ocular diseases of various species.

423. Small Animal Ophthalmology (2) III. Buyuk- nish 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 non-domestic animals.

424. Current Topics in Veterinary Oncology (1) III. Thelen, McDevill Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Fundamentals of oncology for veterinary students with objectives of clinical practice, research or academic careers. Topics will include etiology, diagnosis, and treatment of cancer in domestic animals.

425B. Pulmonary Medicine (2.9) I. George Lecture—23 hours; laboratory—6 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Principles of cardiovascualr medicine (pathophysiology, diagnosis, and treatment) in animals.

425D. Urinary System, Abnormal (2.5) II. Cowgill Lecture—20 hours; laboratory—5 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of the urinary system and diseases affecting this system in animals. Manifestations, pathogenesis, pathophysiology, diagnosis and medical and surgical treatment of urinary system disease discussed.

426. Principles of Anesthesiology (1.7) III. Stetfly Lecture—15 hours; laboratory—2 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Basic principles of veterinary anesthesiology including the techniques, monitoring, and management of anesthesia in animal patients, the clinical use of anesthetic drugs and anesthetic equipment.

427. Equine Internal Medicine (3) III. Madigan Lecture—30 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Advanced equine medical diseases including sections on general medicine, respiratory and gastrointestinal, hematology, dermatology, neurology, oncology, and ophthalmology.

428. Food Animal Surgery (1.6) III. Smith Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (SU grading only.)

428L. Food Animal Surgery Laboratory (0.7) III. Smith Laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 428 (concurrently). Representative surgeries of food animals performed by groups of students. Laboratory fee—$10 per student.

429A. Herd Health Management of Beef, Cattle, Sheep, Swine, and Goats (4) II. Hjelle Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems approach to providing veterinary service to feedlot, cow-calf, stocker, swine, sheep, and goat production units are considered, with emphasis on prevention and control of disease.

429B. Dairy Herd Health Management (4) III. Weaver Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems approach to providing veterinary services to dairy farms with emphasis on disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

430. Principles of Radiology and Radiographic Anatomy (3.3) I, II. Hornd Lecture—26 hours; laboratory—4 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Physical principles of x-ray production and x-ray/matter interactions as they pertain to diagnostic medical imaging and radiation safety and normal radiographic anatomy of the skeleton, head, thorax, abdomen, and extremities. (Deferred grading only, pending completion of two-quarter sequence.)

430B. Gastrointestinal Diseases of Small Animals (2.5) II. Stormbeck Lecture—25 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of digestive system and diseases affecting digestive system in small animals. Manifestations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatments of gastrointestinal disease including diseases of the liver and pancreas.

430C. Gastrointestinal Diseases of Large Animals (2.5) III. Smith Lecture—25 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of digestive system and diseases affecting digestive system in large animals. Manifestations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatments of gastrointestinal disease including diseases of the liver and pancreas.

431. Endocrinology and Metabolism (2.0) II. Black Lecture—20 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Provides a basic understanding of the principles of the normal physiologic function of the endocrine glands, their hormones, and other factors that affect the regulation of metabolic processes.

433. Avian Medicine (1.6) III. West Lecture—15 hours; one examination period. Prerequisite: second-year standing in School of Veterinary Medicine. Overview of select infectious diseases of poultry including their diagnosis, management, and control.

434. Infectious Diseases (4.5) I. Pedersen Lecture—45 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Overview of select infectious diseases of companion and food animals.

435. Veterinary Hematology (5.5) IV. Zini Lecture—32 hours; laboratory—23 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Hematopoietic system of animals in health and disease: development of the system, regulatory mechanisms, blood and bone marrow cell morphology and function, methods of evaluation, effects of disease on the system and diseases of the system. (Deferred grading only, pending completion of two-quarter course.)

436. Public Health and Food Safety (2) III. Genigeorgis Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to preventive aspects of ve-
nary practice. May be repeated for credit. Students in combined DVM/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

473. Large Animal Practice Clinics (2.5-15) I-II-III.
Hijere Veterinary clinical practices—40 hours, plus animal-patient care and emergency/light coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to large animal veterinary practice. May be repeated for credit. Students in combined DVM/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

474. Equine Practice Clinics (2.5-15) I-III.
Hijere Veterinary clinical practices—40 hours, plus animal-patient care and emergency/light coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

475. Food Animal Practice Clinics (2.5-15) I-III.
Hijere Veterinary clinical practices—40 hours, plus animal-patient care and emergency/light coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to food animal veterinary practice. May be repeated for credit. Students in combined DVM/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

476. Zoological Practice Clinics (2.5-15) I-III.
Hijere Veterinary clinical practices—40 hours, plus animal-patient care and emergency/light coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to zoological veterinary practice. May be repeated for credit. Students in combined DVM/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

477. Companion Animal Practice Clinics (2.5-15), I, II, summer. Hijere 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 DVM/MPPM 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/MPPM program enroll for the Summer Sessions I and I sequence. (SU grading only, pending completion of three-term sequence.)

480. IR3A. Clinic Rounds for Freshmen (0.4-0.4) II-III. The Staff (Director Veterinary Medicine Teaching Hospital in charge) Discussion—eight 1 1/2 hour sessions per year. Prerequisite: first-year standing in School of Veterinary Medicine. † Discussion of selected cases from VM Teaching Hospital. (SU grading only, pending completion of course sequence.)

481A-481B. C. Second-year Clinic Rounds (1.2) I-II-III. The Staff (Director Veterinary Medicine Teaching Hospital in charge) Discussion—twelve 1 1/2 hour sessions per year. Prerequisite: second-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (SU grading only, pending completion of three-quarter sequence.)

**Veterinary Microbiology and Immunology**
(School of Veterinary Medicine)
Laurel J. Gerashwin, Chairperson of the Department Office, 2075 Haring Hall (916-752-1400)

**Faculty**
Alexander A. Ardanis, D.V.M., M.S., Professor (Medicine).
Norman F. Baker, D.V.M., Ph.D., Professor Emeritus
L. B. Bisberard, D.V.M., Ph.D., Professor
Walter M. Boyce, D.V.M., Ph.D., Assistant Professor
Antony E. Castro, D.V.M., Ph.D., Associate Adjunct Professor (California Veterinary Diagnostic Laboratory)
Patricia A. Conrad, D.V.M., Ph.D., Assistant Professor
Laurel J. Gerashwin, D.V.M., Ph.D., Associate Professor
Sharon K. Hietara, Ph.D., Assistant Professor (California Veterinary Diagnostic Laboratory)
Dwight C. Hirsh, D.V.M., Ph.D., Professor
Ranse B. LeFebvre, Ph.D., Assistant Professor
Preson A. Lushnig, Ph.D., Associate Dean Professor
John W. Oasbold, D.V.M., Ph.D., Professor Emeritus
Jeffery L. Scott, Ph.D., Associate Professor
Richard L. Walker, D.V.M., Ph.D., Ph.D., Assistant Professor (California Veterinary Diagnostic Laboratory)
Ming Ming Wong, Ph.D., Professor Emeritus
Tiahun Yima, D.V.M., Ph.D., Professor
Yuan Chung Zee, D.V.M., Ph.D., Professor

**Courses in Veterinary Microbiology and Immunology**

***Upper Division Courses***

128. Fundamentals of Immunology (3.0) I. Stott Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or equivalent. Immune response: cell-mediated, humoral immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

120L. Immunology Laboratory (1.0) I, II, III. Lab procedure in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5.0) III. Lefebvre Lecture—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 disease. Limited enrollment.


**132. Introduction to Parasitology** (5.0) III. Cread Lecture—3 hours; laboratory—6 hours. Prerequisite: biological sciences 101A. The taxonomy, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory study supplemented with pertinent material in the literature.

198. Directed Group Study (1-5) I, II, III. The Staff (Gerashwin in charge) Prerequisite: consent of instructor. (P/NP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Gerashwin in charge) (P/NP grading only)

**Graduate Courses**

228. Molecular Biology of Animal Virus (3.0) II. The Staff Lecture—3 hours. Prerequisite: course 128 or Microbiology 162 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 (3.0) II. Stott Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Lecture—3 hours; laboratory—6 hours. Prerequisite: immunological determinants, complement. Biology of lymphocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenic mechanisms in immunological disease: immunotolerance, transplant unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunobiology and immunology. Offered in odd-numbered years.

251. Seminar in Immunology (1.0) I, II, III. Gerashwin Seminar—1 hour. A discussion of the current topics in immunology. (SU grading only)

252. Seminar in Animal Virology (1.0) I, II, III. Yima, Zee Seminar—1 hour. A discussion of the current topics in animal virology. (SU grading only) (Same course as Microbiology 296)

253. Seminar in Infectious Diseases (1.0) I, II, III. Hirsh Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (SU grading only)

254. Seminar in Parasitology (1.0) I. Boyce, Conrad Seminar—1 hour. Discussion of current topics in veterinary parasitology and entomology.

256. Microbiological Diagnosis (2.0) I, II, III. Gerashwin, Hirsh Discussion—1 hour; laboratory—6-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrently); consent of Chief of Microbiology, VM Teaching Hospital. Lab diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (SU grading only)

258. Group Study (1-5) I, II, III. The Staff (Gerashwin in charge)

259. Research (1-12) I, II, III. The Staff (Gerashwin in charge) (SU grading only)
VETERINARY PHARMACOLOGY AND TOXICOLOGY
(School of Veterinary Medicine)
Shri N. Girí, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 2165 Haring Hall (916-752-1059)

Faculty
Pierre C. Becker, Ph.D., Assistant Adjunct Professor
Alan R. Buckpitt, Ph.D., Associate Professor
Gaylord M. Conzelman, Jr., Ph.D., Professor Emeritus
Francis D. Galey, D.V.M., Ph.D., Assistant Professor (Veterinary Pharmacology and Toxicology. California Veterinary Diagnostic Laboratory)
Shri N. Girí, B.V.Sc., Ph.D., Professor
Robert M. Joy, Ph.D., Professor
James B. Knask, Ph.D., Assistant Adjunct Professor
Michael E. Mount, D.V.M., Ph.D., Associate Professor
Isaac N. Pessah, Ph.D., Associate Professor
Otto G. Rasbe, Ph.D., Professor in Residence (Veterinary Pharmacology and Toxicology. Civil Engineering)
Henry J. Segall, Ph.D., Professor
Philip R. Villet, D.V.M., Ph.D., Assistant Professor
Hanspeter Wüthrich, M.D., Professor (Medicine, Internal Medicine)

Courses in Veterinary Pharmacology and Toxicology
Upper Division Course
199. Special Study for Advanced Undergraduates—1, 2, 3, 4. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only)

Graduate Courses
223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine (2) II. Villot 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. Rasbe Lecture—2 hours. Prerequisite: Biochemistry 101A-101B and Physiology 100A-100B. Toxicity and metabolism of inorganic compounds with emphasis on heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions on metal-protein interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis. Offered in odd-numbered years.

247. Natural Toxins (2) II. Segall Lecture—2 hours. Prerequisite: organic chemistry, Biochemistry 101A-101B, or consent of instructor. Toxicity 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 even-numbered years.

253. Drug Metabolism (2) III. Buckpitt Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 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 biological disposition of the drugs. Offered in even-numbered years.

258. Receptor-Mediated Mechanisms (2) III. Pessah Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern methods for studying physiological receptors including radioligand binding analysis, ion transport/flux measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug/toxicant interactions. Offered in odd-numbered years.

288L. Laboratory in Receptor Methods (1) II. Pessah Laboratory—3 hours. Prerequisites: 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 radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in odd-numbered years.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. (SU grading only)

297T. Tutoring in Veterinary Pharmacology and Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Students assist in preparation and teaching of courses in Veterinary Pharmacology and Toxicology or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience. May be repeated for credit up to 5 units. (SU grading only)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Group study in selected areas of Pharmacology and Toxicology. (SU grading only)

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

Professional Course
405. Veterinary Clinical Pharmacology (2) II. Villet Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Pharmacological basis of therapeutic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, its dosage form, route of administration and dose for treatment of certain disease conditions. (SU grading only)

VITICULTURE AND ENOLOGY
(College of Agricultural and Environmental Sciences)
Michael G. Mullins, Ph.D., Chairperson of the Department
Department Office, 1023 Wicksen Hall (916-752-0380)

Faculty
Douglas O. Adams, Ph.D., Assistant Professor
Maynard A. Amerine, Ph.D., Professor Emeritus
Linda F. Bean, M.S., Associate Professor
Roger B. Boulton, Ph.D., Associate Professor (Viticulture and Enology. Chemical Engineering)
James A. Cook, Ph.D., Professor Emeritus
Richard E. Keper, Ph.D., Professor Emeritus (Chemistry)
W. Mark Kriewel, Ph.D., Professor
Laurel E. Kunkee, Ph.D., Professor
Lloyd A. Lider, Ph.D., Professor Emeritus
Mark A. Matthews, Ph.D., Associate Professor
Carole P. Meredith, Ph.D., Associate Professor
Janice C. Morrison, Ph.D., Assistant Professor
Michael C. Nymann, Ph.D., Maynard A. Amerine Professor of Enology and Viticulture
Ann C. Noble, Ph.D., Professor
Herald P. Oron, Ph.D., Professor Emeritus
Cornelius S. Ough, D.Sc., Professor

NOTE: For key to footnote symbols, see page 133.

Dewey D. Y. Ryu, Ph.D., Professor (Chemical Engineering)
Vernon L. Singleton, Ph.D., Professor
M. Andrew Walker, Ph.D., Assistant Professor
Robert J. Weaver, Ph.D., Professor Emeritus
A. Desmond Welch, Ph.D., Professor Emeritus
Larry E. Williams, Ph.D., Associate Professor

The Program of Study. Enology is a specialization under the Undergraduate Science major, and viticulture is a specialization under the Plant Science and the Agricultural Science and Management (Plant Science option) majors.

Graduate Study. Various graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. degree see Agricultural and Environmental Chemistry. Botany, Chemical Engineering, Ecological Food Science, Genetics, Horticulture, Microbiology, Plant Physiology, and Soil Science. For the Ph.D. degree see Agricultural and Environmental Chemistry. Botany, Chemical Engineering, Ecological Genetics, Microbiology, Plant Pathology, Plant Physiology, and Soil Science.

Courses in Viticulture and Enology
Lower Division Courses
2. Introduction to Viticulture (2) II. Mullins Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses.

3. Introduction to Wine Making (3) I. Noble; II. Kunkee; II. Mullins Lecture—3 hours. This broad overview of wines introduces students having a general interest (or potential fermentation science (enology) majors) to history of wine, physiology of alcohol, wine appreciation, viticulture, fermentation, and wines produced in California and other areas of the United States and world.

99. Special Study for Undergraduates—1, 2, 3, 4. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses
101A. Viticultural Practices (2) II. Walker Discussion-laboratory—4 hours. Prerequisite: course 2. Provides the information needed to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

101B. Viticultural Practices (2) II. Kriewel Discussion-laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including pruning, propagation, weed identification and control, frost protection, and physical examination of soil profiles and root distribution patterns.

101C. Viticultural Practices (2) II. Kriewel Discussion-laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality.

110. Grapevine Growth and Physiology (3) III. Adams, Matthews Lecture—3 hours. Prerequisite: course 2. Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis, translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered.

111. World Viticulture (3) I. Meredith Lecture—3 hours. Prerequisite: upper division stand-
ing. 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 (2) I. Williams
   Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. Offered in even-numbered years.

116. Winegrape Production (3) III. Kiewer
   Lecture—3 hours. Prerequisite: course 2. Covers pruning, training and trellising, irrigation, harvesting, and quality control.

118. Grapevine Pests, Diseases and Disorders (3) I. Williams
   Lecture—3 hours. 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 reviewed. Integrated management approach to pest control methods will be emphasized. Offered in odd-numbered years.

123. Analysis of Musts and Wines (3) I. Ough
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 11. Study of the current analytical methods used to understand students in Fermentation Science, Plant Science, and grape students in Agricultural and Environmental Chemistry. Food Science, Horticulture, and Microbiology. Principles of principals of grapevine and wine analysis, and the reasons for use of each analysis. Analytical protocols of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biological methods.

124. Wine Production (3) I. Bisson
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 3, Microbiology 2, 3, and Biochemistry 101A; course 125 may be taken concurrently. Open to undergraduate students in Fermentation Science, Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology; or consent of instructor. Major types of wines and factors influencing their quality; principles of sensory evaluation.

125. Wine Types and Sensory Evaluation (3) II.
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 124, Agricultural Science and Management 150, and consent of instructor. Open to upper division students in Fermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology; or consent of instructor. Major types of wines and factors influencing their quality; principles of sensory evaluation.

126. Wine Processing (4) II. Boulton
   Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 124. Principles of chemistry and design of wineries and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and techniques of operation and to the performance of each equipment with grapes, juices, and wines.

140. Distillation and Wine Technology (3) III.
   Lecture—3 hours. Prerequisite: Chemistry 8B; Food Science and Technology 110A, Distillation principles and practices; production technology of brandy, whiskey, rum, vodka, gin, and other distilled beverages; characteristics of new materials, fermentation, distillation, and aging. Offered in even-numbered years.

145. Critical Evaluation of Wines of the World (3) III. Noble and Stalnaker
   Laboratory-discussion—2 hours. Prerequisite: course 125. To analyze critically wines from specific regions will be evaluated in weekly meetings. Assigned students will provide reading for each session. Discussion will focus on the wine sensory properties to the assigned reading.

186. Fermentation Science (3) III. Kunkee, Ogudez
   Lecture—3 hours. Prerequisite: Microbiology 2, 3, 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 odd-numbered years.

192. Internship (1-12) I, II, III. Summer. The Staff
   (Chairperson in charge)
   Laboratory—3-36 hours. Prerequisite: completion of 84 units. Work experience related to Fermentation Science Department. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (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

210. Grape Development and Composition (4) III.
   Morrison
   Lecture—3 hours; discussion—1 hour. 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 winemaking.

216. Vineyard Establishment and Development (3) I. Kiewer
   Lecture-discussion—2 hours; fieldwork—3 hours. Prerequisite: course 125, 115 or 116, or consent of instructor. Application of basic knowledge in viticulture, horticulture, and environmental science to establishment and development of grapevines. To provide a comprehensive feasibility study of suitability of a given piece of property for growing wine, raisin, or table grapes. Offered in even-numbered years.

217. Microbiology of Wine Production (3) III. Kunkee
   Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 123, 124, Microbiology 3, Biochemistry 101A, and Chemistry 8B; course 125, 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines.

219. Plant Phenolics (3) III.
   Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B or the equivalent and consent of instructor. Flavonoids and other natural phenolic substances of plants; their chemistry, natural occurrence, biochemistry, relation to human diets, and relation to properties of foods and other products.

235. Winery Design and Economics (2) II. Boulton
   Lecture—3 hours; 4 design classes; field trip. Prerequisite: course 135. Food Science and Technology 110A-110B, and Computer Science Engineering 10 or Engineering 5. Specialization in the design and economic evaluation of modern commercial wineries. Emphasis is given to the design of new wineries and the interaction of size, grape and bottle prices on the economic feasibility of the venture. (Offered in odd-numbered years.)

250. Seminar (1-5) I, II, III. Adams
   Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

260. Advanced Research Conference (1) I, II, III.
   Research Faculty
   Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion of current and critical evaluation of original research being conducted by the group. Discussed led by individual research instructors for research groups. May be repeated for credit. (S/U grading only.)

291. Advances in Viticulture (1) I. 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. (S/U grading only.)

292. Advances in Enology (1) I. Kunkee
   Discussion—1-2 hours, seven to ten weeks. Prerequisite: courses 123, 124, 125, 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with their current research interests. May be repeated for credit. (S/U grading only.)

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 wish to teach and have a working knowledge of the subjects. Course contact primarily in laboratory of discussion sections, and under direction of a faculty member. (S/U grading only.)

298. Group Study (1-5) I, II, III.
   The Staff (Chairperson in charge)
   (S/U grading only.)

299. Research (1-12) I, II, III.
   The Staff (Chairperson in charge)
   (S/U grading only.)

War-Peace Studies

(College of Letters and Sciences)

The interdisciplinary minor in War-Peace Studies examines factors affecting the onset of world war and efforts to establish world peace. Students in the minor are encouraged to participate in the programs of the Davis Chapter of the UC Institute on Global Conflict and Cooperation (GICO). For more information on Davis IGC, call 916-752-6562. The minor is sponsored by the Department of Sociology, 139 Young Hall. The faculty advisor is Prof. John L. McKee. Department of Sociology 102B Young Hall; 916-752-0728.

Minor Program Requirements:

- UNITS: War-Peace Studies 23-24
- Cultural Taxonomy: One course from the following:
  - American Studies 101F
  - Comparative Literature 157
  - Geography 124
  - Russian 130
- Economic and Historical: One course from the following:
  - Economics 117, 120

NOTE: For key to footnote symbols, see page 133.
Water Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Departments of Land, Air and Water Resources; Agricultural Engineering; Civil Engineering; Geology; and Geography.

Related Major Program. See the major in Soil and Water Science.

Graduate Study. A program of study is offered leading to the M.S. degree in Water Science. Detailed information can be obtained from the graduate adviser. Also see the Graduate Division section in this catalog.


Courses in Water Science

Questions pertaining to the following courses should be directed to the instructor or to the Resources Sciences Teaching Center, 122 Hoagland Hall (916-752-1669).

Lower Division Courses

10. Water and Society (3) III. Sk
   Lecture—2 hours, discussion—1 hour. Prerequisite: Physics 10 or Geology 1. Occurrence, transport and quality of water; 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 prediction in relation to use of water for municipalities, agriculture, industry, waste management, fish and wildlife, and recreation. General Education credit: Natural and Environment/Non-Introductory. Recommended GE preparation: Physics 10, Geology 1, or Chemistry 10.

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.

42. Water Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-experience on and off campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Water Science (4) I. Grimmer
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A, Physics 5A, and Biological Sciences 1C or Plant Science 2; Chemistry 1B and Physics 5C recommended. Introduction to scientific principles as applied to water and water 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 Environment/Non-Introductory. Recommended GE preparation: Chemistry 10 and Physics 10.

103. Water Quality, Salt Control and Reclamation (4) I. Bigger
   Lecture—3 hours; laboratory—3 hours. 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) III. Haiao
   Lecture—3 hours, discussion—1 hour; two mid-quarter examinations to be arranged. Prerequisite: course 100 or the equivalent preparation in the elements of water of soil and plants. Soil Science 100 and one additional course in soil or plant 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) II. The Staff
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 5A; Soil Science 100 recommended. General course for engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops, procedures for determining frequency and depth of irrigation, drainage.

122. Biology of Running Waters Laboratory (2) I. Knight
   Laboratory—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and junior standing, course 122 (concurrently). Course allows interested students to obtain experience in sampling, processing, and synthesizing field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems.

140. Seepage and Drainage (3) III. Grimmer
   Lecture—4 hours. Prerequisite: course 103A or course 142. Flow through porous media, measurement of hydraulic conductance, seepage under hydraulic structures, anisotropy, flow nets, drainage design for water table and salt control. (Same course as Agricultural Engineering 140.)

141. Hydrology (3) III. Puente
   Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrologic analysis—considering precipitation, stream flow, and ground water phenomena.

142. HydraulicSc (I). Scott, Burgy
   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.

145. Irrigation and Drainage Systems (4) II. Walder, Grimmer, Hills
   Lecture—4 hours. Prerequisite: Engineering 103A or course 142. Engineering principles and scientific principles applied to the design of surface, sprinkler and micro-irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage systems is emphasized. (Same course as Agricultural Engineering 145.)

149A. Groundwater Hydrology (3) I. Marino

149B. Groundwater Hydrology (3) II. Fogg

149L. Groundwater Hydrology Laboratory (1) II. Fogg
   Laboratory—3 hours. Prerequisite: course 149A or Civil Engineering 144; course 149B (may be taken concurrently). Groundwater flow and transport. Processes are illustrated in experiments carried out with lab apparatus, computers, or analytical models. Well-test analysis in non-ideal aquifers, computer modeling of flow and transport, field-testing of wells.

150. Water Law and Water Institutions (3) III. The Staff

154. Water and Related Resource Allocation from Economic Principles (2) I. Grimes
   Lecture—2 hours. Prerequisite: Mathematics 16A or consent of instructor. An 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 even-numbered years.

160. Surface Water Application Systems (3) II. Wallander
   Lecture—3 hours. Prerequisite: courses 110, 142, and Mathematics 16B. Application of physical and engineering principles to design, construction, operation and maintenance of surface irrigation systems, including planning for on-the-farm land leveling and water delivery.

172. Farm Irrigation Management (3) III. Hopmans
   Lecture—3 hours; one field trip. Prerequisite: course 104 or 110, or consent of instructor. Field trips are an integral part of planning. Rain gun irrigation is used as a means of orderly analysis of plant, soil, climatic, systems, 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 courses 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 geochronal cycles is stressed. Covered are chemical characteristics of rainwater and snow, streams and rivers, lakes, estuaries, wetlands, and oceans.

192. Water Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: senior standing. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 193.
Wildlife and Fisheries Biology

(Wildlife and Fisheries Biology major deals with the relationships among the needs of man and the requirements of wildlife (including fishes). Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations. Certain species of wildlife are threatened because they cannot adapt to man’s activities, whereas others thrive well under man-made changes in the environment that their numbers must be controlled. A third wildlife problem is the optimal management of recreational or commercial harvests.

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 wildlife or fisheries. The major is designed primarily for students interested in eventually becoming professionals in wildlife and fisheries biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as the Wildlife Society, American Fisheries Society, or the Ecological Society of America or preparation for specialized research-related graduate studies may also be achieved by careful planning of electives with a faculty adviser.

Graduate training in the Division of Wildlife and Fisheries Biology leads to M.S. and Ph.D. degrees in the following disciplinary fields as Ecology, Physiology, Applied Mathematics, International Agricultural Development, and Animal Behavior under the supervision of a Wildlife and Fisheries Biology faculty member. 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, sportsmen’s clubs, aquaculture operations, and environmental consulting firms. Others, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions. Most of these positions have been attained after further study and relevant experience.

B.S. Major Requirements:

UNITS

Written/Oral Expression ........................................ 8

English (English 1) ........................................... 4

Rhetoric (Rhetoric and Communication) ........................................... 1

Note: above courses simultaneously satisfy College requirements.
Preparatory Subject Matter

- Biological sciences (Biological Sciences)
  1A, 1B, 1C
- Chemistry (Chemistry 1A, 1B, 8A, 8B)
- Computer science (Computer Science)
  Engineering 10 or Engineering 51
- Mathematics (Mathematics 16A, 16B, 16C)
- Physics 11P (Physics 11A, 1B, 8C, 8D)
- Statistics (Statistics 13 or Agricultural Science and Management 150)

Breadth/General Education

- 6-24

Depth Subject Matter

- 38-41

Chemistry (Biochemistry and Biophysics)

10A-10B or Physiological Sciences

10A-10B

Ecology (Environmental Studies 100 or Zoology 125)

- 3-4

Evolution (Genetics 103 or Zoology 148)

- 3

Genetics (Genetics 100)

- 3

Physiology (Physiology 110)

- 3

Vertebrate anatomy (Zoology 105)

- 3

Wildlife and fisheries (Wildlife and Fisheries Biology 122, 130, 140)

- 3-4

Restricted Electives (Select Plan I or Plan II)

- 25-26

Plan I: Wildlife Biology specialization

Botany (Botany 102 or 106, Botany 117)...

Statistics (Statistics 104, 106, 108, or 110)

Wildlife biology (Wildlife and Fisheries Biology 100, 110, 111, 111L)

- 13

Plan II: Fisheries Biology specialization

Aquatic entomology/invertebrate zoology

(Entomology and Zoology 112 with advisor's approval)

Fisheries biology (Wildlife and Fisheries Biology 102, 120, 120L, 121)

Limnology/stream biology (Environmental Studies 116 or 150C or 151 or Water Science 122)

Statistics (Statistics 104, 106, 108 or 110)

- 6-9

Unrestricted Electives

- 16-47

Total Units for the Degree

- 180

Major Adviser:

Contact Department office (66 Briggs). Graduate Study:

See the Graduate Division section in this catalog.

Related Courses:

A selection of courses may depend on each student's special interest. A set of related courses is available from advisors.

Courses in Wildlife and Fisheries Biology

Lower Division Courses


Lecture-3 hours; discussion-1 hour. Prerequisite: Biological Sciences 1A recommended. Concepts of ecology needed to understand wildlife issues such as endangered species, fisheries management, hunting and pest management. Includes political, economic, social, and legal aspects. General Education credit: Nature and Environment/Introductory.

92. Internship (1-6). I, II, III. The Staff (Department Chairperson in charge)

Laboratory-3 to 18 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only).

Upper Division Courses

100. Field Methods in Wildlife Biology (3). III. The Staff

Lecture-10 hours total; laboratory-40 hours total (5 days). Prerequisite: course 110 or 111L, Zoology 125 or the equivalent; consent of instructor. Intensive course on methods of studying and reporting data obtained from free-ranging wildlife. Held between winter and spring quarters; considered a spring course for preenrollment. Limited enrollment. (P/NP grading only)

102. Field Studies in Fisheries Biology (5) Extra-

session summer. M. Cech

Discussion-1 hour; laboratory-40-60 hours. Prerequisite: upper division course each in ecology and fish biology; consent of instructor. Special session course emphasizes field research and investigation in fisheries biology including capture methods and individual research projects on ecology, behavior, physiology, or population biology of fishes at the field site relative to their habitats. Offered in odd-numbered years.

110. Mammalian Biology and Ecology (5) III.

Schwab

Lecture-2 hours; discussion-1 hour; laboratory-6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or the equivalent; course in ecology recommended. Integrated introduction to the biology and ecology of ruminant mammals. Emphasis on natural history, taxonomy, geographical-ecological distribution, anatomical-physiological-behavioral adaptations of mammals to their environment, and research-management methodologies.


Lecture-3 hours. Prerequisite: upper division course in ecology or consent of instructor. Phylogenetic, distribution, migration, reproduction, population dynamics, behavior, and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, and management considerations. Students who have had Zoology 137 may not receive credit for both courses.

111L. Laboratory in Biology and Management of Wild Birds (2). I, Anderson, Raveling

Laboratory-6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in bird speciation, identification, anatomy, molt, age and sex, specialized adaptations, behavior, and research and management techniques.

120. Biology of Fish (3) I. Myole

Lecture-3 hours. Prerequisite: Biological Sciences 1B. Introduction to ecology, morphology, evolution, and systematics of fishes and their relationship to fisheries management.

120L. Biology of Fish Laboratory (1) I. Myole

Lecture-3 hours. Prerequisite: course 120 (may be taken concurrently). Laboratory exercises in the morphology, systematics, and identification of fishes, emphasizing the freshwater and marine fishes of California.

121. Physiology of Fishes (4) I. 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.

Botstorf

Lecture-3 hours; laboratory-3 hours. Prerequisite: Mathematics 16A-16B; Statistics 13 or the equivalent; 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, changes-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment); case histories.

130. Physiological Ecology of Wildlife (4) II.

Jacobsen

Lecture-3 hours; discussion-1 hour. Prerequisite: course 110, 111, or 120; Physiology 110 and Zoology 125 or the equivalent. A study of animal functions, adaptation, energetics of wildlife. Nutrition, metabolism, thermoregulation, and productivity are emphasized as a pattern of relationships for understanding the distribution and abundance of wildlife in time and space.

131. Biology and Management of Cervidae (3) III.

Jacobsen

Lecture-2 hours; laboratory-3 hours. Prerequisite: Physiology 110 and Zoology 125, or the equivalent; course 110 recommended. Evolution, biology, and management of cervids. Topics include differences in nutritive ecology, bioenergetics, reproduction and growth, use of habitats, and research methodologies.

136. Ecology of Waterfowl and Game Birds (3) II.

Raveling

Lecture-2 hours; laboratory-3; field trip. Prerequisite: courses 110 or the equivalent. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in even-numbered years.

140. Ecology and Evolution of Vertebrate Social Organization (4) II. Lott

Lecture-4 hours. Prerequisite: Biological Sciences 18 or upper division ecology course (Zoology 125 or the equivalent). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to humans and other primates.

151. Wildlife Ecology (3). I. van Vuren

Lecture-3 hours. Consideration of the ecology of wildlife species in man-disturbed environments, including ecological aspects of wild vertebrates in relation to reforestation, land management, and pollution; the relationship of wildlife to recreation and wildlife; and resource conservation in the human ecosystem.

153. Wildlife Ecotocology (4) II. Anderson

Lecture-3 hours; discussion-1 hour. Prerequisite: Introductory courses in organic chemistry, ecology, and physiology, or consent of instructor. Environmental Toxicology 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotocology, examples/case histories, philosophical/mangement considerations. Offered in odd-numbered years.

190. Proseminar in Wildlife and Fisheries Biology (1) I, II, III. The Staff

Seminar-1 hour. Prerequisite: upper division standing in biological sciences or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated twice for credit. (P/NP grading only).

90C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)

Discussion-1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only).

191. Museum Science (2) II. Cole

Lecture-1 hour; laboratory-3 hours. Prerequisite: upper division standing and consent of instructor. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. Offered in even-numbered years. (P/NP grading only).

192. Internship (1-12) I, II, III. Summer. The Staff

(Chairperson in charge)

Laboratory-3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only).

197. Tutoring in Wildlife and Fisheries (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: major in Wildlife and Fisheries Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only).

NOTE: For key to footnote symbols, see page 133.
Women's Studies Program

Women’s Studies Program

(College of Letters and Science)
Judith Newton, Ph.D. Program Director
Program Office, 307 Young Hall (916-752-4696)

Committee in Charge
Carol Joffe, Ph.D. (Sociology; Women’s Studies)
Sudia Joseph, Ph.D. (Anthropology)

34 Anna K. Kuhn, Ph.D. (German)
34 Latina Mari, Ph.D. (History)
34 Jacqueline Mitchell, Ph.D. (English)
Linda A. Morris, Ph.D., ex officio (English)
Belinda Robnett, Ph.D. (Sociology)

Vicki Ruiz, Ph.D. (History)
Judith Stacey, Ph.D. (Sociology; Women’s Studies)
Bev Tuel (Staff Assistant)
Trang T.T. Duong (Academic Peer Advisor)

Faculty
Cynthia L. Brantley, Ph.D., Associate Professor (History)
Angela Fullam, Ph.D., Associate Professor (Chicano Studies)
Doris Earnshaw, Ph.D., Lecturer (Comparative Literature)
Karen P. Erickson, Ph.D., Professor (Psychology)
Diane Fellmeier, Ph.D., Associate Professor (Sociology)
Yvette Flores-Ortiz, Ph.D., Assistant Professor (Chicano Studies)

Jack D. Forbes, Ph.D., Director (Native American Studies)
Zurilda Gertel, Ph.D., Professor (Spanish and Classics)
Sandra Gilbert, Ph.D., Professor (English)
Carole Henton, Ph.D., Assistant Professor (Linguistics)

Inez Hernandez, Ph.D., Assistant Professor (Native American Studies)
Sarah B. Hrdy, Ph.D., Professor (Anthropology)
Mary Jackman, Ph.D., Professor (Political Science)
Carol Joffe, Ph.D., Professor (Sociology; Women’s Studies)

Sudia Joseph, Ph.D., Associate Professor (Anthropology)
Cathy Kudish, Ph.D., Assistant Professor (History)
Anna K. Kuhn, Ph.D., Associate Professor (German)
Dianne Sachko Macleod, Ph.D., Assistant Professor (Art History)

Lata Mari, Ph.D., Assistant Professor (Women’s Studies)
Susan Mann, Ph.D., Professor (History)
Sandra J. McPherson, Ph.D., Professor (English)
Jocelyn Mitchell, Ph.D., Associate Professor (Afro-American Studies)
Patricia Moran, Ph.D., Assistant Professor (English)
Judith Newton, Ph.D., Associate Professor (History)

Beatrix M. Pesquera, Ph.D., Assistant Professor (Sociology; Chicano Studies)
Michel Prasger, Ph.D., Assistant Professor (French and Italian)
Donna Reed, Ph.D., Lecturer (Comparative Literature)
Adi Rissel, Ph.D., Professor (Chicano Studies)
Belinda Robnett, Assistant Professor (Sociology)
Irig Roppolt, Ph.D., Professor (Art History)
Lynn Rolle, Ph.D., Assistant Professor (Classics)
Ruth E. Rosen, Ph.D., Assistant Professor (History)

Vicki Ruiz, Ph.D., Professor (History)
Stephanie A. Shields, Ph.D., Associate Professor (Psychology)

Barbara Somoroff, Ph.D., Lecturer (Psychology)
Judith Stacey, Ph.D., Professor (Sociology; Women’s Studies)
Margot Stange, Ph.D., Assistant Professor (English)

NOTE: For key to footnote symbols, see page 133.

Women’s Studies Program

Preparatory Subject Matter

Women’s Studies 50

All Preparatory Subject Matter listed for a single discipline in an area of student’s interest, chosen in consultation with advisor...

A.B. Major Requirements:

UNITS

Preparatory Subject Matter

Women's Studies 50

Women's Studies 190A-190B

At least 36 upper division units to be chosen with consent of adviser including at least 6 units from Area A, at least 12 units from Area B, and up to 16 units of special topic courses...

Area A: Women and the Humanities...

Comparative Literature 135, 150C, 155, 165, 185, 195, 215,

Area B: Gender and Society...

Zoology

Chicano Studies 102, Human Development 110, Native American Studies 180, Political Science 166, Psychology 114, 149, Sociology 131, 132, 133. Special topic courses (maximum) 16 (List of acceptable courses offered throughout the University will be available from major advisers.)

Total Units for the Major.............68-77

Recommended
The following courses are recommended: American Studies 1T, 30, Biological Sciences 10, Economics 151B, Genetics 10, History 72B, Physiology 10, Statistics 13.

Minor Program Requirements:

Women's Studies.................24
Women's Studies ............4
Upper division units in women's studies area with courses to be chosen in consultation with advisor.............20
At least 4 units must be from Area A (above) and 8 units from Area B (above). Remaining courses may be elected from Area A and/or B, and/or from relevant special topic courses in the field (Current list is available from Women's Studies advisors).

Major Advisor. See Class Schedule and Room Directory.

Courses in Women's Studies

Lower Division Course

50, Introduction to Women's Studies (4) I, II, III.
The Staff
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/Non-Introductory. Recommended GE preparation: any introductory GE course in the areas of Civilization and Cultures or Contemporary Societies.

Upper Division Courses

190A. Senior Research Seminar I (4) I. The Staff
Seminar—4 hours. Prerequisite: twenty units in Women's Studies and consent of instructor. Guided reading, discussion, and writing, culminating in the preparation of a research proposal.

190B. Senior Research Seminar II (4) I, II. The Staff
Seminar—4 hours. Prerequisite: course 190A. Completion of individual research project formulated in course 190A; seminar discussion of topics and problems related to individual projects.

192. Internship in Women's Studies (1-12) I, II, III.
The Staff
Work-learning experience—3-36 hours; written report. Prerequisite: completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a woman's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.)

197T. Tutoring in Women's Studies (1-4) I, II, III.
Women's Studies advisors
Tutoring—3-12 hours. Prerequisite: upper division standing; completion of course to be tutored with grade of A- or better. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course materials, advising on projects and papers, leading discussion groups. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Zoology

(College of Letters and Science)

John H. Crowe, Ph.D., Chairperson of the Department
Annette M. Shapiro, Ph.D., Vice-Chairperson of the Department
Department Office, 2320 Storer Hall (916) 752-1272

Faculty

Peter B. Armstrong, Ph.D., Professor
Richard J. Baskin, Ph.D., Professor
James S. Clegh, Ph.D., Professor
John H. Crowe, Ph.D., Professor
David W. Deam, Ph.D., Professor
Olaf Ells, Ph.D., Assistant Professor
Carol A. Erickson, Ph.D., Professor
Robert D. Grey, Ph.D., Professor
Richard K. Grobicki, Ph.D., Associate Professor
Herbert H. Hibbard, Ph.D., Professor Emeritus
Everton W. Jameson, Jr., Ph.D., Professor Emeritus
Roger J. Leslie, Ph.D., Assistant Professor
Marc A. Manheim, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor
E. Miller, Miller, Ph.D., Professor Emeritus
Brian Muller, Ph.D., Professor
Jeanette A. Naitke, Ph.D., Assistant Professor
Richard L. Nuccitelli, Ph.D., Professor
Lauren E. Rosenberg, Ph.D., Professor Emeritus
Robert L. Rued, Ph.D., Professor Emeritus
George W. Satt, Ph.D., Professor
Thomas W. Schoener, Ph.D., Professor
Jonathan M. Schreiber, Ph.D., Assistant Professor
H. Bradley Shaffer, Ph.D., Associate Professor
Annette M. Shapiro, Ph.D., Professor
Judy Stamps, Ph.D., Professor
Catherine A. Toff, Ph.D., Associate Professor
Kenneth E. West, Ph.D., LL.D., Professor
Martin Wilson, Ph.D., Associate Professor
Stephen L. Wolfe, Ph.D., Lecturer Emeritus

The Major Programs

The Zoology major presents animal biology from the subcellular and molecular to the community and ecosystem levels. As a basic life science major, it is suitable for students who plan to pursue a professional career in Zoology, to go on and graduate work in Zoology or another life science, or who intend to apply to professional schools in the health sciences. The major is structured to ensure breadth of preparation while still allowing individualization of each student's program in accordance with his or her interests.

Students majoring in Zoology 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 transfer to UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College.
The Bachelor of Arts and the Bachelor of Arts and Science degrees are offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

A.B. Major Requirements:

Preparatory Subject Matter.............41-45
Chemistry 1A, 1B, 8A, 8B, 16
Biological Sciences 1A, 1B, 1C, 15
Mathematics 16A-16B or Statistics 102
1-6
Physics 1A-1B or 5A-5C
6-8

Depth Subject Matter.............36
Genetics 100
Zoology 130 or 121A-121B
4-8
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151, 151A
Additional upper division course work in biological science to achieve a total of 96 units or more
20-25
Include at least (a) 15 units in zoology, and (b) one course from two of the four Areas of Study shown below.

Total Units for the Major.............77-81

Recommended
Geology 3, Physics 5C; Biochemistry 101A-101B or Physiological Sciences 101A-101B.

B.S. Major Requirements:

Preparatory Subject Matter.............54-59
Chemistry 1A, 1B, 1C
Chemistry 8A-8B or 128A-128B-128C...
Biological Sciences 1A, 1B, 1C...
Mathematics 16A-16B or 21A-21B...
Physics 5A, 5B, 5C...

Depth Subject Matter.............49
Biochemistry 101A-101B or Physiological Sciences 101A-101B...
Genetics 100...
Statistics 102...
Zoology 130 or 121A-121B...
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151...

Additional upper division course work in biological science to achieve a total of 49 or more units
22-28
Include at least
(a) 15 units in zoology.
(b) 6 units (or 18 hours) of laboratory.
(c) one course from three of the four Areas of Study shown below.

Breadth Subject Matter

College of Agricultural and Environmental Sciences students.............23
English and/or rhetoric
Social sciences and/or humanities
See also the College section for additional requirements.

College of Letters and Science students:
Refer to the College section for a description of requirements to be completed in addition to the major.

Total Units for the Major.............103-108

Recommended
Chemistry 5, Mathematics 16C or 21C, Geology 3.

Areas of Study

1. Ecology and behavior: Zoology 125, 147, 149, 155, Environmental Studies 100.
4. Physiology: Zoology 121C, 142L, 143; Physiology 110, 110L.

Note: A maximum of 5 units of variable-unit courses (numbered 192, 194, and 198) may be applied to upper division elective unit requirements. Zoology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered
99. Special Study for Lower Division Students (1-5). I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses

100. Embryology (4). I. Armstrong, II. The Staff; III. Erickson
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; concurrent enrollment in course 100L. Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organization, and cell differentiation, with emphasis on vertebrates.

100L. Laboratory in Vertebrate Embryology (1). I. Armstrong, II. The Staff, III. Erickson
Laboratory—3 hours. Prerequisite: course 100 (concurrently). Comparative analysis of the embryonic development of vertebrates. (P/NP grading only)

101. Advanced Developmental Biology (4). I. Erickson, Nastria, Nuccitelli
Lecture—2 hours; laboratory—6 hours; report: Prerequisite: courses 100, 100L, Biochemistry 101A, 101B; consent of instructor. 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. A written report due at end of quarter.

102. Senior Colloquium in Developmental Biology (2). I. Grey
Lecture—1 hour; seminar—2 hours. Prerequisite: course 100 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.

105. Phylogenetic Analysis of Vertebrate Structure (4). I. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. The classes and subclasses of vertebrates is described and interpreted in terms of phylogeny.

106. Functional Analysis of Vertebrate Structure (3). I. Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1A, 1B. Mechanical principles are used to interpret the structure associated with supporting the body, running, digging, climbing, swimming, flying, and feeding. Emphasis is on the skeletal system of mammals.

106P. Project on the Functional Analysis of Vertebrate Structure (1). I. Project report or 2-hour: course 106 may be taken concurrently. A paper of about 5,000 words, or a dissertation with explanation, analyzing the function of a selected aspect of vertebrate structure.

112. Invertebrate Zoology (4). I. Grossberg, Ellers
Lecture—4 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, course 112L (concurrently); courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla emphasizing aquatic forms and focusing on morphology, development, natural history, and phylogenetic relationships.

112L. Laboratory for Invertebrate Zoology (3). I. Grossberg, Ellers
Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B; course 112 concurrently. Field and laboratory experience with representatives of the invertebrate phyla discussed in courses 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates.

121A. Cell Biology (4). I. Nuccitelli
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in animal biology (may be taken concurrently). An introduction to modern cell biology with emphasis on cell ultrastructure, membranes and organelles, the cytoskeleton, and bioenergetics.

121B. Cell Biology (4). I. Natzle
Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory course in biochemistry; introductory course in genetics recommended. Discussion of modern cell biology with emphasis on the structure of the nucleus, cell cycle, information transfer, the immune system, and cancer cell biology. Students who have had Zoology/Botany 130 may receive only 2 units for course 121B.

121C. Advanced Cell Biology (4). I. Baskin
Lecture—3 hours; extensive reading and research report: Prerequisite: Biochemistry 121B, Mathematics 16B. Physical-chemical basis of cell structure and function, including a discussion of aspects of biological thermodynamics, the ionic basis of excitation, and the molecular basis of excitability.

121L. Cell Biology Laboratory (3). I. L. Crowe
Lecture—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101A-101B; courses 121A,121B recommended, or consent of instructor. Exercises illustrating the principles of cell biology, emphasis on individual research employing one or more advanced techniques.

122. Histology (4). I. Crowe
Lecture—3 hours; laboratory—2 hours. Prerequisite: course 121A; working knowledge of elementary physiology is essential. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes.

122L. Histology Laboratory (3). I. Crowe
Laboratory—6 hours. Prerequisite: course 122 (may be taken concurrently). Laboratory practice in histological and cyto-techniques; use of such techniques in research. Design and execution of a research project is required.

125. Animal Ecology (3). I. The Staff; II. Schoener and Toft; III. Watt
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. General survey of the concepts of animal ecology.

130. Survey of Cell Biology (4). I. Leslie; II. Falk (Botany), Treg (Botany)
Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 68B or 128C; introductory course in biochemistry strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include energy metabolism, motility, gene expression, and membranes. Currently popular methodologies used in cell biology will be presented in a discussion section. Not open to students who have received credit for Zoology 121A or 121B (same course as Botany 130).

133. Patterns in Vertebrate Biology (3). I. Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Vertebrate thermoregulation, and water balance, circadian and circannual activity, communication, breathing, movements and feeding patterns.

133L. Systematics and Field Studies in Cold-Blooded Vertebrates (3). I. Lecture—6 hours; field trips. Prerequisite: course 133 and consent of instructor. Systematic and faunal studies on poikilothermic vertebrates. Offered in odd-numbered years.

134. Herpetology (3). I. Shaffer
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; course 148 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavioral ecology, functional morphology, and evolutionary history. Offered in odd-numbered years.

134L. Herpetology Laboratory (1). I. Shaffer Laboratory—3 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographical and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in odd-numbered years.

136. Mammalogy (2). I. Jones
Lecture—2 hours. Prerequisite: course 125 or equivalent general course in ecology. Systematics, life history, reproduction, distribution, and physiology of wild mammals.

136L. Mammalogy Laboratory (3). I. Jones
Laboratory—6 hours; extensive weekend field-trips.

NOTE: For key to footnote symbols, see page 133.
Zoology

Prerequisite: course 125 or 136, and consent of instructor. Systems of California mammals, techniques of study in professional mammalogy. May be taken concurrently with course 136.

137. Ornithology (2) III. The Staff Lecture—2 hours. Prerequisite: course 125 or the equivalent course. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildfife and Fisheries Biology 111 may not receive credit for this course.

137L. Ornithology Laboratory (3) III. The Staff Lecture--3 hours. Prerequisite: course 125 or consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics, and reproduction of California birds.

138. Ecology of Tropical Latitudes (3) III. Shapiro Lecture—3 hours. Prerequisite: one of any of the following: Biological Sciences 1B, 1B, or 1B, Botany 10, Geography 2 or 2G, or Wildlife and Fisheries Biology 10. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. General Education credit: Nature and Environment/Non-Introductory. Recommended: preparation: Biological Sciences 10, 10, or Wildlife and Fisheries Biology 10.

141. Principles of Systematic Zoology (3) III. Shapiro Lecture—2 hours; twice weekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 148 or Genetics 103 recommended. Historical background, biological, philosophical rationale, contemporary approaches, and working rules of animal systematics, including International Code of Zoological Nomenclature.

142. Invertebrate Physiology (4) II. Crowe Lecture—3 hours; term paper; individual conferences. Prerequisite: course 112, Chemistry 1A, 1B, Physics 6C; Biochemistry 101A, 101B recommended. Comparative physiology of invertebrate organ systems.

142L. Invertebrate Physiology Laboratory (3) III. 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.

143. Neurobiology (4) III. Wilson Lecture—3 hours; extensive reading. Prerequisite: Biological Sciences 1A, 1B, 1C; Biochemistry 101A-101B or the equivalent. Neuronal structure; impulse transmission; neurotransmitters and transmitters; neuropharmacology; receptors; growth and differentiation of neurons and nervous systems; genetics of behavior.

143L. Neurobiology Laboratory (6) III. Mulleney, Wilson Lecture—1 hour; discussion—1 hour; laboratory—12 hours. Prerequisite: course 143 and consent of instructor. Physics 3C recommended. Students will learn to test action potentials and synaptic circuits, to interpret quantitatively their recordings, and to use vital dyes and intracellular stains. Limited enrollment.

147. Zoogeography (4) II. Shapiro Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals.

148. Animal Phylogeny and Evolution (4) II. Shapiro Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; Genetics 100; ecology and biochemistry recommended. Introduction to current evolutionary theory. Development of the concept of the central unifying theory in evolutionary biology will be emphasized.

149. Evolution of Ecological Systems (4) III. Shapiro Lecture—3 hours; term paper. Prerequisite: course 125 or Environmental Studies 100 (or the equivalent) and course 148 or Genetics 103 (or the equivalent). Evolution of animal and plant species. Distributional, evolutionary, and speciation processes. Co-evolution in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation.

155. Behavior of Animals (5) II. Martin 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.

189. Introduction to Biological Research (1), III, IV. The Staff (Chairperson in charge). Discussion—1 hour. Prerequisite: upper division standing in Zoology or related biological sciences; consent of instructor. Introduction to research methods in biology. Presentation and discussion of research by faculty, graduate, and undergraduate students. May be repeated for credit up to a total of 3 units. (P/N grading only.)

190. Undergraduate Seminar in Zoology (2). Shapiro; III, Deamer Seminar—2 hours. Prerequisite: upper-division standing in biological sciences or related discipline. Student reports on current topics in zoology, broadly conceived, written reports and related literature, discussion 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/N grading only.)

192. Internship (1-12). I, II, III. The Staff (Chairperson in charge). Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience offer and on campus in all subject areas offered in the Department of Zoology. Internships supervised by a member of the faculty. (P/N grading only.)

194A-194HBC. Research Honors in Zoology (3), II, III. The Staff (Chairperson in charge). Laboratory—6 hours. Prerequisite: students majoring in Zoology who have completed 135 units and qualify for the honors program (as defined in the current catalog). Honors research under guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Zoology (1-5) I, II, III. The Staff (Chairperson in charge). Discussion—1-2 hours. Prerequisite: upper-division standing. Extensive tutorial and counseling in college biology under guidance of staff. (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 (1-5), I, II, III. The Staff (Chairperson in charge). (P/N grading only.)

Graduate Courses

200. Current Techniques in Cell Biology (2). Nuccitelli Lecture—2 hours. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunohistochemistry, histology, organole, isolation, calorimetry, tissue culture and gel electrophoresis. Lectures presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (SU grading only.) (Same course as Cell and Developmental Biology 200.)

200A. Cell and Developmental Biology Laboratory (3) I, II, III. The Staff (Chairperson in charge). Laboratory—18 hours (five weeks only). Prerequisite: course 200 (may be taken concurrently). One five-week assignment in research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/procedural experience and experimental design. (Same course as Cell and Developmental Biology 200BL.)

200BL. Cell and Developmental Biology Laboratory (6) I, II, III. The Staff (Chairperson in charge). Laboratory—18 hours (five-week assignments). Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratory of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodology/procedural experience and experimental design. (Same course as Cell and Developmental Biology 200BL.)

202. Biometrics (6) III. Watt Lecture—4 hours; laboratory—6 hours. Prerequisite: two courses in calculus, courses in statistics. Mathematical aspects of physiological and epistemology, development and testing of models, mathematical description of biological systems; measurement, analysis, simulation and optimization in biology.

203. Global and Regional Modeling (6) II. Watt Lecture—1 hour; discussion—1 hour; seminar—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B, Statistics 106 and 106 or 121A-131B-131C; FORTRAN. Use of statistical analysis of data, mathematical modeling, and computer simulation of the world or regions to provide basis for policy recommendations and new legislation.

204. Cellular Basis of Morphogenesis (4) III. Armstrong Lecture—3 hours; term paper. Prerequisite: course 100. Development of form and structure, morphogenesis, movement, malformation, wound healing, cell adhesion, intercellular interaction, invasion of cells and tissues in development. Offered in odd-numbered years.

205. Pattern Formation (4) II. Nuccitelli Lecture—3 hours; term paper. Prerequisite: course 100 or 121A or the equivalent, and consent of instructor. Morphogenesis and mechanism of pattern formation in biology. Pattern formation in all forms of life. Emphasis will be on cell polarity but some multicellular systems will also be covered. Offered in odd-numbered years.

206. Mechanisms of Organogenesis (4) II. Erickson Lecture—3 hours; term paper. Prerequisite: course 100. Course will demonstrate the various ways by which several cell types become organized and differentiated to form a functional unit, using five selected organ systems. Offered in even-numbered years.

207. Topics in Advanced Ornithology (4) III. Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing; course 137 or the equivalent. Advanced training in ornithological methodology. Specific ecological and morphological areas of avian study. Laboratory oriented toward the breeding ecology of birds in the Central Valley area of California, but will also deal with aspects of avian anatomy.

212. Topics in Invertebrate Evolution (2) III. Grosberg Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and courses 112L-113L, courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary periods among the invertebrates. May be repeated for credit when topic differs. (SU grading only.)

222. Topics in Advanced Ecology (2) II. Schoener Lecture—1 hour; seminar—1 hour. Prerequisite: Ecology 204 or the equivalent. Each year, some topic of current research interest will be critically reviewed. Possible topics include feeding strategies, island ecology, competition. Time will be divided between lecture and student presentations. May be repeated for credit when a different topic is studied. (SU grading only.)

223. Modeling in Behavioral and Evolutionary Ecology (3) II. 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 fitness associations with different behavioral and developmental adaptations. Will enable students to develop and apply models. Offered in odd-numbered years.

225. Biology of Fertilization (3) III. Grey Lecture—2 hours, term paper. Prerequisite: course 121A in the equivalent level of instructor. The morphology, physiology, and biochemistry of gametes and the mechanism and consequences of their union. Offered in even-numbered years.

226. Cell and Molecular Biology of Cancer (1) I. Armstrong Lecture—2 hours (first five weeks of quarter). Prerequisite: course 100 or one course from courses 121A, 121B, or 130; or Biochemistry 101A-101B or Physiological Sciences 101A-101B. Analysis at the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, identification and characterization of oncogenic agents, characterization of oncogenes and anti-oncogenes.

228. Experimental Animal Ecology (3) II. Lecture—2 hours, 3 weekend field trips, 2 written critiques. Prerequisite: course in animal ecology. Discussion of means of generating ecological hypotheses and methods of testing those hypotheses. Topics will include analysis of field observation, experimental design in both field and laboratory, and interpretation of results. Limited enrollment.

236. Muscle Physiology (4) I. Baskin Lecture—2 hours, discussion—1 hour, term paper. Prerequisite: Biochemistry 101A-101B and Mathemati cs 16B or 21B, or consent of Instructor. The physical and chemical aspects of muscle function.

240. Topics in Cell Biology (3) I. Deemer Lecture—2 hours, discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in the area of cell biology. May be repeated for credit.

241. Membrane Biology (3) II. Deemer Lecture—3 hours. Prerequisite: courses 121A-121B or Biochemistry 101A-101B recommended, or consent of instructor. Course emphasizes biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membranous components of cells. Offered in odd-numbered years.

242. Research Conference in Cell Biology (1) I. Natzie, II. Scholey, III. Deemer Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of faculty and graduate student research in cell biology. May be repeated for credit. (SU grading only.)

243. Topics in Cellular and Behavioral Neurobiology (2) III. Wilson Seminar—2 hours. 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.)

252. Ecology of Arthropod Populations (2) II. Toft Lecture—1 hour, seminar—1 hour, student presentations. Prerequisite: course 125 or the equivalent; graduate-level background in ecology recommended. In-depth examination of the ecology of arthropod populations, emphasizing population interactions, particularly competition, predation (including parasitism), mutualism. Topics will vary from year to year. Offered in even-numbered years. (SU grading only.)

254. Ecology of Parasites (2) I. Toft Lecture—1 hour, seminar—1 hour. Prerequisite: course 125 or Entomology 104 or the equivalent; graduate-level background in ecology recommended. Population dynamics of parasites and pathogens, emphasizing species of ecological importance but also including species of medical and economic interest. Offered in even-numbered years. (SU grading only.)

259. Seminar in Cell Biology (2) II. Leslie Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in intracellular and function of cells. Organizational and functional properties on the molecular and cellular levels of biological systems.

260. Research Conference in Developmental Biology (1) I, II, III. Erickson, Nucetelli Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of faculty and graduate student research in developmental biology. Intended primarily for graduate students. (SU grading only.)

270. Research Conference in Evolutionary Biology (1) I, II, III. Shaffer, Grosberg Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. (SU grading only.)

283. Neurobiological Literature (1) I. Muloney, II, III. Wilson Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. (SU grading only.)

287. Seminar in Animal Behavior (2) III. The Staff Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

290. Current Topics in Zoology (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.)

290C. Research Conference in Zoology (1) I, II, III. The Staff Chairperson in charge Discussion—1 hour. Prerequisite: graduate standing in Zoology and consent of instructor. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (SU grading only.)

291. Current Topics in Developmental Biology (1) Ill, Nucetelli Seminar—2 hours (alternate weeks). Seminar on current topics in developmental biology will be presented and discussed. Speakers will be drawn from the University and outside the system when feasible. (SU grading only.)

292. Seminar in Development (2) II. Erickson, Armstrong Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms.

293. Seminar in Invertebrate Zoology (2) II. Crowe Seminar—2 hours. Prerequisite: course 112, or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrates. Open to qualified undergraduates.

294. Seminar in Animal Ecology (3) I. Seminar—3 hours. Prerequisite: course 125 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

295. Seminar in Marine Invertebrate Ecology (2) II. Seminar—2 hours. Prerequisite: course 112 and consent of instructor. Reports and discussion on current topics in marine invertebrate ecology. Open to qualified undergraduates.

296. Seminar in Geographical Ecology (2) I. Sapiro Seminar—2 hours. Prerequisite: course 125 or 148 or Genetics 103 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. (SU grading only.) May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff Chairperson in charge (SU grading only.)

NOTE: For key to footnote symbols, see page 133.
OTHER USEFUL PUBLICATIONS

Undergraduate Admissions Circular
A complete statement of the University's requirement for admission as an undergraduate.
Office of Undergraduate Admissions, 175 Mrak Hall, or from your high school or community college counselor. (No charge.)

Answers for Transfers
A question-and-answer booklet for students who want to attend a community college before transferring to the University. Gives information about University admission requirements, costs, financial aid, and advice on planning your program and transferring courses to UC.
Available from University Admissions Offices and Relations with Schools Offices, and at community college counseling offices. (No charge.)

UC Davis Poster/Calendar
Information for prospective students about UCD programs and activities, plus a wall poster and calendar marking important dates and UC application deadlines.
Office of Undergraduate Admission, 175 Mrak Hall. (No charge.)

Graduate Announcement, UC Davis
Brief descriptions of the graduate programs and research resources including admission requirements, procedures and dates for filing applications, degrees offered, fields of study, degree requirements, fees and expenses, financial aid and student services, and sources of additional information. Course descriptions are not included.
Dean of the Graduate Division, 252 Mrak Hall. (No charge.)

College of Engineering Bulletin
A detailed description of College of Engineering programs, majors, and course offerings.
College of Engineering Dean's Office, 2132 Bainer Hall. (No charge.)

School of Law Catalog
A detailed description of admissions requirements, academic programs, courses of instruction, faculty, law school activities, and general information about the School of Law.
Office of Admissions, School of Law, University of California, Davis 95616. (No charge.)

Graduate School of Management Bulletin
Admission requirements, description of academic programs, courses of instruction, faculty, and general information.
Graduate School of Management, 308 Voorhies Hall, University of California, Davis 95616. (No charge.)

Announcement of the School of Veterinary Medicine
A complete statement of the School of Veterinary Medicine requirements for admission into the Doctor of Veterinary Medicine program.
Office of Associate Dean—Student Services, School of Veterinary Medicine, University of California, Davis 95616. (No charge.)

Class Schedule and Room Directory
Issued quarterly. Lists times and place of meeting for specific classes, instructors, and units of credit. Also contains information on registration and enrollment in classes. Available for 50 cents at the UCD Bookstore. (Not available by mail.)

Summer Sessions Bulletin
Complete information about summer session courses and instruction.
Office of the Summer Sessions, 44 Mrak Hall. (No charge.)

Educational Opportunity Program (EOP) Brochure
Information on applying to the EOP program; application dates.
EOP Office of Admissions, 175 Mrak Hall. (No charge.)

Financial Aid at UCD
Information on financial aid: grants, loans, and work-study at UCD.
Financial Aid Office, North Hall. (No charge.)

People and Places at UCD
The student orientation handbook giving descriptions of campus services, activities, and information sources.
Available free from Advising Services, South Hall. (Not available by mail.)

Student Directory
Student directory, combined with information on ASUCD activities and services and campus organizations.

Student Viewpoint
Student-compiled evaluations of courses and professors by in-class surveys, ASUCD Catalog of student services and organizations and STUDENT Directory of student names, addresses and phone numbers.
Student Viewpoint Office, 13 Freeborn. (No charge. Available by mail.)

Venture
University Extension quarterly catalog. Complete information about Unex courses, including times and location.
University Extension, 1333 Research Park Drive. (No charge.)

City of Davis Information
Chamber of Commerce, 228 B Street, Davis, CA 95616.
GLOSSARY

Academic Senate The faculty governing body of the University. Consists primarily of the regular faculty and certain administrative officers. Determines conditions for the admission of students and for granting certificates and degrees, develops educational policy, and authorizes and supervises all courses in the University.

Academic year Starts at the beginning of the Fall Quarter, ends at the close of the Spring Quarter; does not include summer sessions.

Add/Drop Petition A petition used when you want to add, change or drop a course to your study list. (Sometimes referred to as an Add/Drop card.)

Advanced degree Any degree beyond the bachelor’s degree.

AOD Stands for “Academic Office Building,” a building that houses administrative and academic offices. AOD is the informal designation until the building is officially named.

ASUCD (Associated Students of the University of California, Davis) The undergraduate student body governing organization at UCD.

College A subdivision of the campus instructional system (e.g., College of Letters and Science). The colleges are further divided into departments (e.g., English, Zoology, etc.) which offer specialized curricula.

Continuing student One who was registered for the immediately preceding term. (A student returning from PELP is also considered continuing.)

Credential A license for public school teaching in California. Programs offering the multiple-subject (elementary) or single-subject (high school) teaching credential are supervised by the Graduate Division in coordination with the Department of Education.

Curriculum (plural, curricula) All the courses of study offered by the University. May also refer to a particular course of study (major) and the courses in that area.

Directed group study A course set up on a one-time basis for a group of students in a subject area where no regular courses have been established.

Discipline A branch of knowledge or teaching. Typically refers to an area of study or a major field.

Enrollment Signing up for a class, either through preenrollment or the submission of an Add Card.

Good standing An undergraduate student who has at least a 2.0 grade-point average in all work completed at the University of California, and who has maintained his or her minimum unit progress requirement for UC Davis, is considered a student in good standing.

Grade-point average (GPA) The GPA is computed by dividing the total number of grade points accumulated by the number of course credits taken. Courses taken P/NP or S/U, or outside of the UC system are not considered (exception, see Incomplete or I grade).

Graduate student A student who is enrolled in the Graduate Division for an advanced degree. Graduate courses at UCD are numbered 200-299.

GSU (Graduate Student Association) The elected representative body for graduate students at UCD.

Independent study A course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within formal course structure.

Independent Study Program A program intended to provide an opportunity for upper division students to pursue a special interest for a full quarter.

International student A student enrolled in nonresident status who is a citizen or resident of another country.

Lower Division Freshman and sophomore standing at UCD (83.9 or fewer units completed); also refers to UCD courses numbered from 1 through 99.

Major The area of academic concentration in which the degree is conferred.

Matriculate To enroll for a degree in a college or school.

Minimum progress Refers to the number of units a student must have completed and passed by the end of a specific number of quarters at UCD.

New student A student beginning work at any level at UCD is considered to be a new student. After one quarter’s attendance at Davis, a student is considered to be a continuing student. Graduate students who were enrolled at UCD as undergraduates are considered to be new students for their first quarter of graduate work.

Part-time student A student enrolled in the Part-Time Degree Program.

Passed/Not Passed (P/NP) option A system used to encourage undergraduate students to experiment in fields outside of their major areas. The “P” grade is given for a grade of C- or better. P/NP grades are not included in a student’s grade-point average, but the units are counted toward the 180-unit graduation requirement.

PELP Any student, new or continuing, can interrupt formal study in a given quarter (or for a maximum of one academic year) by enrolling in the Planned Education Leave Program before the tenth day of instruction. You will not be eligible for most University services, but student employment and counseling services and faculty advising are available. PELP ensures your space in registration for the quarter following your leave.

Petition A request, usually written on a standard form, to adjust a study list or curriculum to fit an individual situation. Also, a request for an exception to a policy or regulation.

Photo ID card A plasticized identification card with a photo provided to each new student. Upon payment of fees a validation sticker is issued to be affixed to this card. The then validated card serves to identify the carrier as a UCD student. There is a replacement fee if lost.

Prerequisite A necessary condition for enrollment in a course or a major. Prerequisites for courses usually consist of a previous course or courses in a related subject area and/ or the instructor’s permission. Prerequisites are indicated in the course descriptions.

Professional school student A student enrolled in the School of Law, Management, Medicine, or Veterinary Medicine.

Probation An indication that performance is below standard because of academic deficiencies; a trial period in which a student is permitted to redeem failing grades or deficient units.

Quarter A subdivision of the academic year at UCD, consisting of three 10-week terms (fall, winter, and spring quarters). The two 6-week summer sessions provide a quarter’s work in a more concentrated format, but are not considered regular quarters. (Attendance at both summer sessions, however, may count as one quarter in residence.)
Quarter units Academic work at the University is measured by quarter units of credit which determine the amount of time a student has formally devoted to a given subject. To convert these units to semester units multiply by 2/3; from semester to quarter units multiply by 3/2.

RA (Research Assistant) RA's are graduate students who do research on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in departments.

RA (Resident Adviser) RA's are student staff members of the Student Housing Office who help plan, coordinate, and conduct educational and social programs to meet residence hall students interests and needs.

RD (Resident Director) RD's are full-time professional staff members of the Student Housing Office. They help residence hall students with academic, housing, and personal problems, and supervise and train student Resident Advisers.

Registration The payment of fees for a term or summer session. Registration also typically involves giving address information and having a photo ID made. By registering, the student informs the University of intent to begin or continue attendance.

Registration card (see Photo ID Card).

Regular session Refers to fall, winter, and spring quarters. Students in the School of Medicine also attend a summer quarter. (See also Semester.)

Repeated courses Courses in which a grade of D or F for undergraduate students and C, D, or F for graduate students can be repeated for a letter grade only. Courses taken on a P/NP or S/U grading basis can be repeated on the same basis or for a letter grade. There are limitations on the number of repeated units that count toward a degree.

Residence This word is used in a number of senses in this catalog; care must be taken to determine the meaning of the word each time it is used: (1) to denote registration in a regular session (i.e., when a student is in "residence" during fall, winter, or spring quarters); (2) to denote the period of time that a student must be registered at UCD in order to be eligible for graduation (i.e., academic residence); (3) to denote a student's state of residence (e.g., California) to determine if non-resident tuition must be paid (i.e., legal residence); (4) to indicate the student's place of residence (i.e., living quarters).

Sabbatical A leave of absence granted to a University professor for travel, research, etc. May be from one quarter to a full year.

Satisfactory/Unsatisfactory The equivalent of Passed/Not Passed for graduate students. The "S" grade is given for a grade of B- or better in graduate courses and C- or better in undergraduate courses.

Semester A subdivision of the academic year into two sessions, usually fall and spring, each lasting approximately 16 weeks. Only the School of Law uses the semester system at UCD. To convert semester units to quarter units, multiply by 3/2.

Study List The official program of courses for which a student registers. Your course enrollment form is submitted to the Registrar at the time of registration each quarter. In the College of Agricultural and Environmental Sciences, the Study List also refers to a student's long-term academic study plan.

Subject A The University's requirement in English composition which must be completed to receive the bachelor's degree.

Summer sessions Two 6-week summer sessions are offered between the close of spring quarter and the opening of fall quarter. Regular instruction, both undergraduate and graduate, is offered for full credit.

TA (Teaching Assistant) TAs are graduate students, usually on the doctoral level, who teach on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in each department.

TB Stands for "temporary building," usually a trailer or prefabricated building not intended as a permanent facility.

TBA Stands for "to be announced." In the Class Schedule and Room Directory course listings, TBA may refer to class meeting time, instructor's name, or room number for class meeting.

Tenure Denotes security of employment until retirement; may be granted to a faculty member after a specified number of years at the University.

Term A regular quarter (fall, winter, or spring) or semester (fall or spring).

Transcript An official copy of your academic record (grades) at an educational institution such as the University of California.

Undergraduate A college student who is pursuing a bachelor's degree.

Unit Courses are assigned a unit value based on one unit of credit for every three hours of work (in-class and preparation time) per week by the student. A student's progress in the University and class level are determined in part by the number of units completed.

Upper Division Junior and senior standing at UCD, based upon completion of at least 84.0 units; also refers to UCD courses numbered 100-199.

Work-Learn An internship program providing on-the-job experience in a student's field of interest. Participation may be full time (during the summer or academic year) or part time, and may be paid or volunteer. Academic credit may also be earned.

Work-Study A financial aid program which provides eligible students with part-time jobs on campus or with off-campus nonprofit organizations.
STATEMENT ON LEGAL RESIDENCE AT THE UNIVERSITY OF CALIFORNIA

Each new student entering the University of California (and each former student returning after an absence of one or more quarters) is required to submit a Statement of Legal Residence to the Office of the Registrar. This Statement is used by the Residence Deputy in determining the residence of each student for fee assessment purposes.

Students who have not been residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee.

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes upon admission to the University of California, an adult student, other than an adult alien present in the United States under the terms of a nonimmigrant status which precludes the alien from establishing domicile in the U.S., must be able to provide evidence of having established his or her residence in California at least one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and must have relinquished any prior residence. An adult student must couple his or her physical presence within this State for one year with objective evidence that such presence is consistent with his or her intent in making California his or her permanent home. If these steps are delayed, the one-year durational period will be extended until BOTH presence and intent have been demonstrated for one full year. Physical presence within the state solely for educational purposes does not constitute the establishment of California residence under State law regardless of the length of the student’s stay in California.

Relevant indicia which can be relied upon to demonstrate one’s intent to make California the permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as the permanent address on all school and employment records, including military records if one is in the military service; obtaining a California driver’s license or California identification Card, if a non-driver; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside this state from the date residence is established; establishing an abode where one’s permanent belongings are kept within California; licensing for professional practice in California; residing in California during summers and holidays; maintaining active checking or savings accounts in California banks; and the absence of these indicia in other places during any period for which residence in California is asserted. Documentary evidence may be required. No single factor is controlling or decisive. All relevant indicia will be considered in the classification determination.

The residence of the parent with whom an unmarried minor (under age 18) child lives is the residence of the unmarried minor child. When the minor lives with neither parent, his or her residence is that of the parent with whom he or she last lived. A minor, except a minor alien who is precluded by the Immigration and Naturalization Act from establishing domicile in the U.S., may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent’s right of control (see Exceptions below). Where the residence of the minor is derived, the California residence of the parent from whom it is derived must satisfy the one-year durational requirement.

An adult establishes his or her own residence. Residence of an adult is not derived from a spouse or parents.

Reclassification

A student seeking resident reclassification for tuition purposes must petition at the Office of the Registrar. Documentation of residence (driver’s license, voter registration receipt, etc.) will be required at that time. Financial independence will be included among the factors considered for students classified nonresident seeking reclassification to resident for tuition purposes. Financial independence will not be considered for graduate students who are teaching assistants, research assistants or teaching associates employed on a 0.49 percent or more time basis for the term for which reclassification is sought. All changes of status must be initiated two weeks prior to the in-person registration period for the quarter or semester for which the student intends to be reclassified. No petitions will be accepted after instruction begins.

Detailed information concerning reclassification can be obtained by contacting the Residence Deputy at the Registrar’s Office.

Incorrect Classification

Those classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts (by the student), the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Residence Deputy at the Registrar’s Office.

Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy at the Office of the Registrar. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Legal Analyst—Residence Matters, 590 University Hall, Berkeley, California 94720, within 90 days after notification of the final decision by the Residence Deputy.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that the rate of nonresident tuition and the residence requirements are subject to change. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Registrar’s Office of the campus.

Exceptions

1. A minor who is a U.S. citizen or eligible alien and who remains in this state after his or her parent, who was a resident of California for at least one year immediately prior to leaving but has established residence elsewhere shall be entitled to retain resident classification if the student enters the University within one year after the parent moves, so long as continuous attendance is maintained at the University.

2. A student who is a U.S. citizen or eligible alien and who is a minor or 18 years of age may be eligible for resident status if he or she can show that he or she has been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and has demonstrated the intent to make California his or her permanent home.

3. A student who is a U.S. citizen or eligible alien shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any
Waivers Of Nonresident Tuition

To the extent funds are available, nonresident tuition waivers may be granted to a spouse and unmarried dependent children under age 21 of a University faculty member who is a member of the Academic Senate. Inquiries regarding this waiver should be directed to the Residence Deputy.

In addition, certain student Teaching Assistants and Teaching Fellows, and certain graduate students designated as University Fellows and Distinguished Scholars may be eligible for nonresident tuition waivers or fellowships. Such students should contact the Graduate Division at their campus for further information.

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, and Sections 503 and 504 of the Rehabilitation Act of 1973, 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, handicap, 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 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, 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 policies may be directed to the Vice Chancellor of Academic Affairs and Affirmative Action Officer, 525 Mirak Hall, 916-752-2070. Speech and hearing impaired persons may dial TDD 916-752-7320.

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 UC Davis 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. Grievance procedures for student complaints charging legally impermissible discrimination (Policy 280-05) are available in the Office of Student Activities and Conduct and may be used to bring complaints of sexual harassment. 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 Activities and Conduct. 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 UC Davis 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 UC Davis 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 previous 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.

Students who desire to withhold their addresses and telephone listings may so indicate by the last day of registration on the Student Data Card included with the registration materials. Students who desire to withhold their entire record must file a form available at the Registrar's Office.

Students availing themselves of this right should understand what the consequences of this action may be. For example, 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 written consent of the student. Similarly, if a request is made to withhold from disclosure a student's name and dates of attendance, a student's status as a student cannot be verified for potential employers without written consent of the student. Furthermore, if a student's last instruction to the campus was to withhold from disclosure the degree granted to that student and the date on which the degree was conferred, that information cannot be confirmed for a 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 of a previous quarter at any time.

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.
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>Field of Study</th>
<th>Animal Science</th>
<th>Applied Economics</th>
<th>Behavioral Science</th>
<th>Food Science</th>
<th>Plant Science (Percentage finding work in field of choice)</th>
<th>Bio-science</th>
<th>Resource Science</th>
<th>Engineering</th>
<th>Humanities</th>
<th>Physical Science</th>
<th>Social Science</th>
<th>Total Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61</td>
<td>77</td>
<td>86</td>
<td>90</td>
<td>100</td>
<td>74</td>
<td>69</td>
<td>97</td>
<td>61</td>
<td>80</td>
<td>70</td>
<td>78</td>
</tr>
</tbody>
</table>

1Source: A 1988 survey of June 1987 graduates conducted by Student Affairs Research and Information, UC Davis.
2Fields of Study are groups of related undergraduate majors; for example, "Animal Science" would include such majors at UC Davis as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

RETENTION DATA AND GRADUATION RATES AT UC DAVIS

Freshmen

(Retention and graduation rates through Spring 1989 for regularly admissible undergraduates entering UC Davis as freshmen.)

<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>1979</td>
<td>2,556</td>
<td>88%</td>
<td>35%</td>
<td>65%</td>
</tr>
<tr>
<td>1980</td>
<td>2,666</td>
<td>89%</td>
<td>36%</td>
<td>67%</td>
</tr>
<tr>
<td>1981</td>
<td>2,610</td>
<td>90%</td>
<td>34%</td>
<td>69%</td>
</tr>
<tr>
<td>1982</td>
<td>2,350</td>
<td>91%</td>
<td>38%</td>
<td>71%</td>
</tr>
<tr>
<td>1983</td>
<td>2,281</td>
<td>92%</td>
<td>32%</td>
<td>71%</td>
</tr>
<tr>
<td>1984</td>
<td>2,780</td>
<td>93%</td>
<td>29%</td>
<td>66%</td>
</tr>
</tbody>
</table>

Transfer Students

(Retention and graduation rates through Spring 1989 for 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>1981</td>
<td>551</td>
<td>87%</td>
<td>41%</td>
<td>75%</td>
</tr>
<tr>
<td>1982</td>
<td>633</td>
<td>86%</td>
<td>33%</td>
<td>70%</td>
</tr>
<tr>
<td>1983</td>
<td>616</td>
<td>89%</td>
<td>36%</td>
<td>75%</td>
</tr>
<tr>
<td>1984</td>
<td>704</td>
<td>89%</td>
<td>35%</td>
<td>72%</td>
</tr>
<tr>
<td>1985</td>
<td>629</td>
<td>90%</td>
<td>35%</td>
<td>71%</td>
</tr>
<tr>
<td>1986</td>
<td>599</td>
<td>91%</td>
<td>32%</td>
<td>67%</td>
</tr>
</tbody>
</table>

1These 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.)
2Source: Student Affairs Research and Information, UC Davis (January 1990).

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 Average Monthly Salary</th>
<th>Master’s Average Monthly Salary</th>
<th>Doctorate Average Monthly Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$2,200-2,891</td>
<td>$2,616-3,225</td>
<td>$4,175-4,602</td>
</tr>
<tr>
<td>Humanities/ Social Sciences</td>
<td>1,922-2,346</td>
<td>1,871-2,481</td>
<td>—</td>
</tr>
<tr>
<td>Allied Health/Life Sciences</td>
<td>1,960-2,450</td>
<td>2,012-2,977</td>
<td>2,539-3,817</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>2,015-2,658</td>
<td>2,780-3,570</td>
<td>3,317-3,854</td>
</tr>
</tbody>
</table>

1Source: College Placement Council Salary Survey (January 1990).
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

Regents Ex Officio
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Douglas L. Minnis, Ed.D., Associate Dean

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About the Cover

Founded in 1908, the library began as a small collection of agricultural bulletins in a room in the old creamery building on the southwest corner of East Quad and Peter J. Shields Avenue. The picture (opposite, top) shows the building in about 1910. By 1924 the library contained two thousand volumes housed in two classrooms. It wasn't until the completion of a new library and administration building in 1940 that the collection, numbering some fifty thousand volumes, was properly housed for the first time.

The color photos on the cover show the Shields Library expansion, completed in early 1990. The addition to the library of more than 121,000 square feet will allow the space shown in the black and white photo on the front cover to be restored to its original use as a reading room. The large room with lofty windows was on the second floor of the 1940 library (all of the campus administration occupied the first floor of this the original north wing) and also contained the reference collection. The periodicals section took over this room in 1967 when the completion of a Shields Library addition provided space for a reference department and reading room on the first floor.

The reference department has changed more than just its location since 1940. Computers have become an important addition to a modern library. Students can use compact disk databases and CD-ROM readers (middle photo) to quickly find references to periodical articles in a number of fields. Since 1983 the MELVYL online catalog has provided computer access to the collection. This access was once only available by using the card catalog (bottom). MELVYL terminals are located throughout the library.

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